July 16, 1945

STEEL

The Magazine of Metalworking and Metalproducing

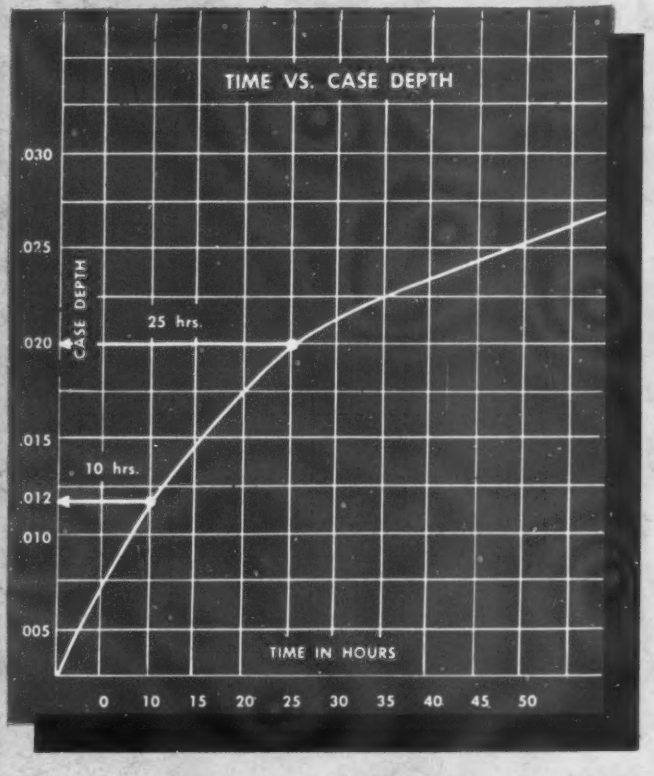
ESTABLISHED 1882

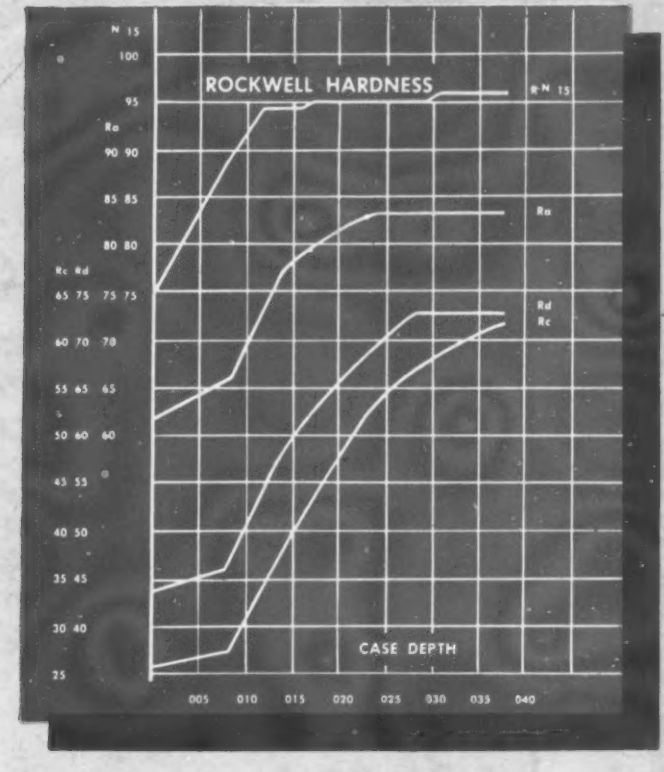
TECHNOLOGY DEPT.

HOLDEN Speed NITRIDING

A Proven Process for Immediate Savings

FOR NITRALLOY, AND OTHER CHROME-MOLY OR STAINLESS STEELS





NO CAPITAL INVESTMENT REQUIRED . . .

1. Equipment to meet your production requirements may be leased.
2. Ship work for commercial processing.

BENEFITS

1. 24 hours maximum cycle
2. Distortion eliminated by uniform heating
3. Short cycle parts may be removed from the furnace at any time

SEND PARTS FOR FREE TEST RUN

THE A. F. HOLDEN COMPANY, *Metallurgical Engineers* NEW HAVEN, CONN.

WAREHOUSES: DETROIT • CHICAGO • LOS ANGELES

MANUFACTURERS OF HOLDEN PRODUCTS IN CANADA PEACOCK BROS. LTD., P. O. Box 6070, Montreal, Canada

SIZE-MATIC DOES HIS THINKING FOR HIM

The Heald Method of Automatic Sizing Means Faster Production . . . Fewer Rejects in Internal Grinding

Add up the time your operators spend with plugs, gages, feelers, calipers—or any other manual method of checking size in internal grinding operations—and you have the best reason in the world for finding out now about automatic sizing—*the Heald way*. With a Heald Size-Matic Internal on the job, for example, your operators *don't have to think* about when your work is to size. The Heald Size-Matic knows!

An "automatic brain" is built into your Size-Matic. It assumes entire responsibility for sizing, by predetermining the exact number of wheel passes required to bring the work to the desired hole size. Sizing is done without any connection with the work. It makes no difference whether you're grinding straight or tapered holes; with or without key ways; open-end or blind; large or small. A Heald Size-Matic means that all your men do is load the work and throw the starting lever to give you faster work and better work—automatically.

MISCELLANEOUS RUNS OR VOLUME PRODUCTION

Only the simplest adjustments are required on a Heald Size-Matic to make it suitable for large production runs, or a wide variety of assorted jobs. In either type of work, tolerances are easily held within ten-thousandths. Exact uniformity is assured.

Heald has proved this automatic principle through 20 years of successful use. But a Size-Matic is only one way of securing the advantages of Heald experience with automatic operation, to gain faster, better lower cost production. Why not ask a Heald Engineer to come in and lay some interesting and profit-making facts before you?

THE HEALD MACHINE COMPANY
WORCESTER 6, MASS.

More Precision · Less Cost **HEALD**

INTERNAL AND SURFACE GRINDING MACHINES • BORE-MATIC PRECISION FINISHING MACHINE

For Hardenability

TRIPLE ALLOY STEELS

The
TRIPLE-ALLOY STEELS

4300
8600
8700
9300
9400
9700
9800
9900

During the past two years, as much triple-alloy tonnage has been produced as all the rest of the alloy steels combined. As a result of this experience, the following points have been well established, both by manufacturers and users:

- *Triple-alloy steels make possible the same depth of hardness that is obtainable in other types of alloy steels.*
- *They have shown a consistently uniform response to heat-treatment.*

Hardenability as an index to other properties is an important factor in alloy-steel metallurgy. In this respect, as well as those mentioned above, triple-alloy steels admirably meet the requirements of the user.

Uniform hardenability can be counted upon in the postwar triple alloys—steels in which the nickel, chromium, and molybdenum are maintained within specified analysis ranges.

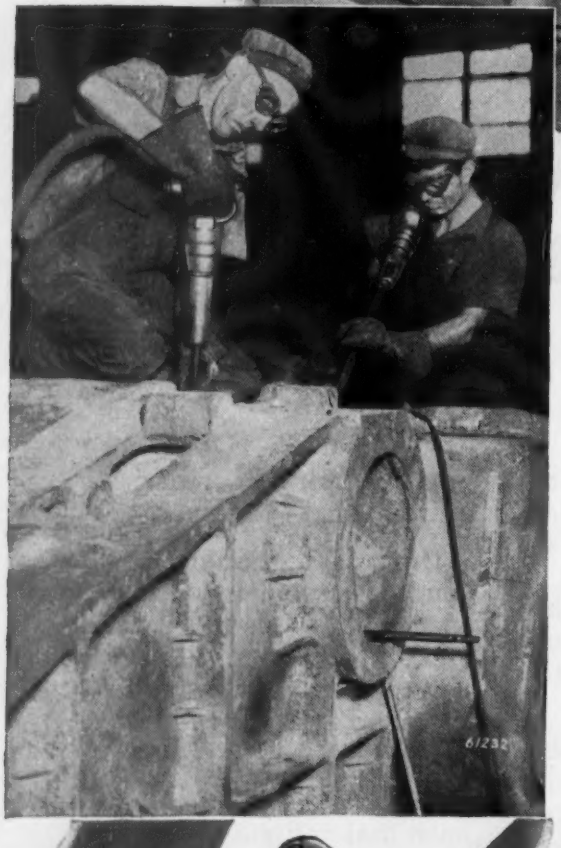
Our metallurgists are available to assist you in any problems that you may have.

Bethlehem Steel Company, Bethlehem, Pa.

Bethlehem Steel Export Corporation, New York City

★ BETHLEHEM STEEL ★

THE Chips TELL THE STORY



The evaluation of work actually done by chipping hammers

If someone told you that your chipping hammers were operating at only 60% cutting efficiency, you wouldn't believe them. Yet it has been found that even good operators cannot be relied upon to find 20% or less difference in the cutting ability of a group of hammers. That difference must be found by measuring the actual metal removed.

Recently a large plant asked our "cutting efficiency service" engineers to check their hammers. Tests soon showed that most of them were in very poor operating condition, so all types were shipped to our factory for a standard comparison cutting test against master hammers. Reports showed that they varied from 40% to 70% low in C. E. and were 6% high in air consumption.

From the tests it was obvious that the continued use of these hammers would cost thousands of dollars. Those beyond economical repair were replaced with I-R Flapper-Valve hammers and the balance were repaired as outlined by our service engineers. Production costs were reduced and more chipping per operator resulted.

An I-R service engineer will be glad to show you how to maintain the highest cutting efficiency for your hammers. A copy of our handy two-color Chipper Repair Wall Chart is yours for the asking.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

8-564

The feather bed that rolls— rubber springs now ready for cars

A typical example of B. F. Goodrich development in rubber

THIS is no future hope, no drawing-board dream — this B. F. Goodrich postwar contribution is finished, tested, will soon be on the road in the newest, most modern buses, can be designed for automobiles, farm tractors, bicycles — in fact almost any vehicle you can mention. It is the "feather bed ride" that designers have longed for — it is the rubber spring.

This B. F. Goodrich development will add more to riding comfort than anything since the air-filled tire replaced the solid tire generations ago. It consists of a metal cylinder filled with rubber, with a shaft at the center. The weight of the car connected to the shaft makes it turn inside the cylinder, gives a twisting action to the rubber. It absorbs practically all the road shocks that ordinarily would pass right through the stiff steel springs.

Research at B. F. Goodrich applies not just to new, unusual things like this but to every kind of rubber product used in home or industry. No product, however familiar, is ever regarded as too "standardized" to be steadily and constantly improved. When you buy a B. F. Goodrich conveyor belt or length of hose or any major industrial installation that includes use of rubber — you may be sure you're buying the latest improvements that science and study can make. This new spring is just one of a series of developments that started years ago and will continue for years to come.

Photo above, taken in a plant of The Twin Coach Company, shows the spring (on the floor) about to be installed in one of the new buses they hope to have on the roads soon. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F. Goodrich

RUBBER *and* SYNTHETIC *products*

BEHIND THE SCENES

Orchids By The Bushel

■ STEEL's Machine Tool study in the June 25 issue apparently hit the jackpot in no uncertain terms. From executives in all branches of the metalworking industry, from machine tool builders and from machine tool accessory manufacturers, and from government agencies and departments, comes a steady flow of appreciative comments. Things like this, for example:

". . . you have made a major contribution. . ."

"It is particularly interesting and stimulating."

"An excellent presentation, in easily and quickly understandable form".

"This study is a valuable contribution to our post-war planning".

"Most informative and interesting".

"This is the most comprehensive and authoritative study we have seen".

And along with all of these beautiful orchids is an equally steady stream of requests for additional copies of the report and the further breakdowns by size of plant, product classification, and geographical location. What we thought was an ample supply of reprints is fast reaching the bottom of the barrel, and the chances are it will have to go back on the press again before long.

Case of the Light Coin

■ We should probably have our head examined for not explaining the rules a little better on that braintwister about the nine coins. In stating that the coins could be moved just twice we meant that only two arrangements of the coins could be used, including the original setup.

Apparently about half of the several dozen guys (and gals) who seemed to be anxious to get a free copy of STEEL's Welding Electrode handbook interpreted it correctly but the other half figured you could have three moves, which is a dorse of a cifferent holor.

We'll quote the answer of Fred Schmitt, Jr., industrial advertising manager of Hercules Powder Co. who says he solved it in 15 seconds, but just between us girls we'll bet he had heard it before.

1. Divide the coins into three piles of three coins each.

2. Take any two of the three piles, and place one on each pan of the balance. If they balance exactly, the light coin is in the third pile. If not, the light coin is in the lighter of the two piles.

3. The coin is now located in one of the three piles. Take any two of the coins in this light pile and place one in each pan of the balance. If they balance, the coin you are seeking is the third one. If they don't, of course, the light coin is the one on the lighter pan.

Wish we had the space to quote all the ribbing letters which have kept us completely chagrined all week, but maybe it's just as well to laugh them off and go merrily on our stumbling way.

Try Again

■ Last night the little woman picked us up at the train and we proceeded to ruin a perfectly beautiful evening by hacking around the local golf course for our second game of the year. We love the game but at this stage wouldn't recognize Old Man Par if he walked right in now and said hello.

All of which is simply a preliminary to dragging in a new "braintwister" for the benefit of other fellow sufferers. The nine holes of a mathematical golf course are 300, 250, 200, 325, 275, 350, 225, 375 and 400 yards long. If a superman could always hit the ball in a perfectly straight line and exactly one of two distances, so that it could either go toward the hole, pass over it, or drop into it, what would the two distances be that would carry him around the course in the least number of strokes? And how many strokes would be required?

Okay, golfers, let's see you work on that one.

Consumer Study

■ With so many limitation orders on consumer goods now cancelled, maybe you'd like to get a better picture of how the consuming public is operating these days, as reported in that favorite of ours. *The Postage Stamp,* by Joe Blow, their new consumer editor:

"Mama and I was lisnin to a radio terminite one eve. give out on some new balony on bedroom suits the Laymedowntosleep Ferniture store jest got in complet from tha rugs on the flore to tha pitchers on tha wall no money down on the mattress an tha springs throne in free. This here ider of a new suit hit Mama square in tha eye an after holdin her at a standstil fer 20 yrs. she decides to cut the perse strings an buy a new bedroom suit.

"I tries like all git out to tell her we shood wate till our ship comes in but she said by tha time that happins weed be out an under. I tole her i positive wood'n go in tha store with her, so when we got to tha joint, some smart jerk with a smirk on his puss greets us like we was monkey meet or somethin.

"From tha 1st time i eye him i do'n like his looks so he asks if tha charming lady wood be interested in a mahogany no. an when tha Mama seys as how she wants to see tha set that Mr. Fizzledrip ballyhood on tha wave lengths for a century even from tha rugs on tha flore to tha pitchers on tha wall he changes his tune an looks reel insulted.

"Wel—we looks and looks, bouncin up and down those mattresses for a good our. Finally tha guy seys maybe weed be interested in a Hollywood and i says id rather take a trip to Florida. Was my face plenty red when i found out he ment all along one of those beds with the bottom off that you can foll outa thre ways insted of to.

"I koboshed this act on a/c i tole tha Mama it would be a jip to pay tha same price for a bed with no foot as fer one with feet in. Mama finnally settled fer a walnut dyed solid gumwood set. There was a ketch in the whole deal an i had to put tha thing together. We bote it 3 months ago an im still tryin to get tha drawers to fit in tha dresser and tha bed to stay together one whole nite.

"Tha only joy i get outa this here new bedrom suit is watchin Mama grit her teeth when she picks herself off the flore 2-3 times a nite when tha bed goes down."

SHRDLU

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Editorial Contents—Page 77

The most revolutionary advance in modern oil-hydraulics

MULTIPRESS with VIBRATORY HydrOILic PRESSURE

FAST APPROACH PORTION OF STROKE (FIXED SPEED)
REGULATIVE PRESSING SPEED PORTION OF STROKE (20 to 200 ipm)
MANUAL OR FULLY AUTOMATIC RAM CYCLING
EACH REPEAT STROKE EXERTS EXACT PRE-SET PRESSURE
DENISON HydrOILic MULTIPRESS
TIME
LENGTH OF REPEAT STROKES REGULATIVE .004 to ½-inch
NUMBER OF REPEAT STROKES REGULATIVE 1 to 25, automatically 1 to infinity, manually
FREQUENCY OF REPEAT STROKES REGULATIVE
RAM FOLLOWS WORK AS IT YIELDS, EXERTING EXACT PRESSURE

Vibratory HydrOILic Pressure — just *one* of many unique control features available with the amazing new MULTIPRESS — imparts any pre-set number of short, rapidly-repeated, exact-pressure strokes *upon each full downstroke of the ram!*

As shown above, these repeat strokes are regulative in length, pressure, speed, frequency, and number per ram cycle. And the ram *follows the work* downward as it yields, exerting exact pre-set pressure on each vibratory stroke.

MULTIPRESS — a completely self-contained, motor-driven, oil-hydraulic bench press, in 4 and 6-ton sizes — makes this *exactly controlled* vibratory action available at surprisingly low cost. Other MULTIPRESS accessories include automatic cycling controls, straightening fixtures, reciprocating tables, pelleting devices, automatic indexing tables, foil feeds, a variety of bolster plates, benches, extension tables, side shelves — to mention only a few. Write today for further information. The Denison Engineering Co., 1163 Dublin Rd., Columbus 16, O.

DENISON EQUIPMENT the APPLIED HydrOILics

HydrOILics INDUSTRY'S RIGHT HAND

Announcing Allis-Chalmers

ELECTRONIC

Here's What it is:

STURDY, Long-Life Oscillating Tube — fully protected by overload relays, water filters and pressure switches.

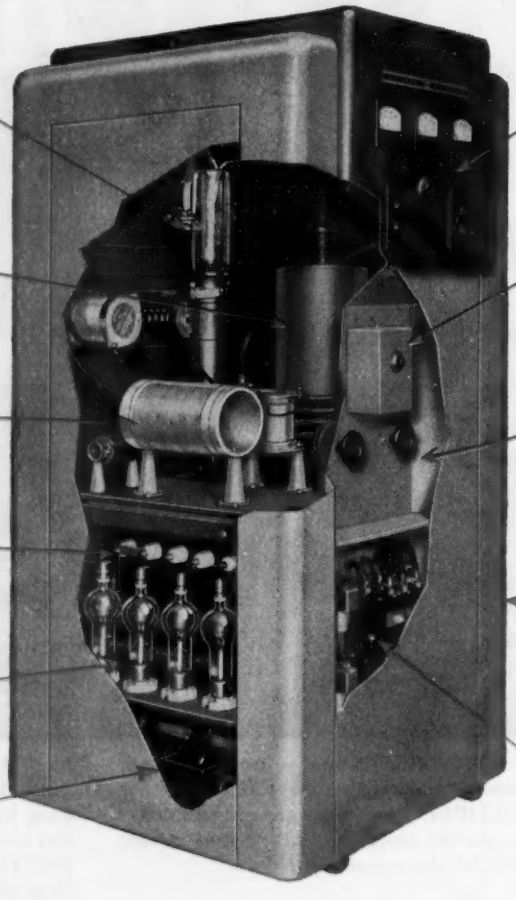
NEW Coupling System, developed by A-C, keeps losses low, permits adaptation to most applications without use of radio frequency transformers.

CHOKE COIL protects rectifier tubes from damage by high-frequency radio currents.

HEAVY-DUTY Transformer for handling overloads, other extreme operating conditions.

3-PHASE Rectifying System obtains maximum power from electronic heater, prevents uneven load on power lines.

INDIVIDUAL Filament Transformer for each rectifier tube, easy to get at.



LARGE Indicator Panel for easy reading — shows at a glance when power is on, grid and plate currents, filament voltage.

AUTOMATIC Timer controls heat sequence from 2/10 seconds to 2 minutes, makes unit easy for unskilled operators to use.

ALL Controls on one panel for easy change in applications. No other internal adjustments needed. Protected from tampering by door and lock.

MODERN Industrial Cabinet encloses complete unit. All-Steel construction. Mounted on casters for mobility.

SAFETY FEATURES: Heavy-duty control, high water-temperature switch, fuses, interlocking switches on doors to protect operators.

Pioneer Builders of Electronic Equipment for Industry.

Allis A-C

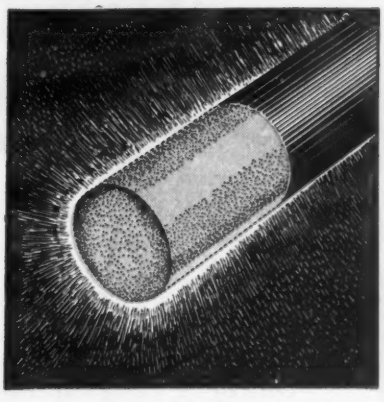
rs Great, New....

CHEATER

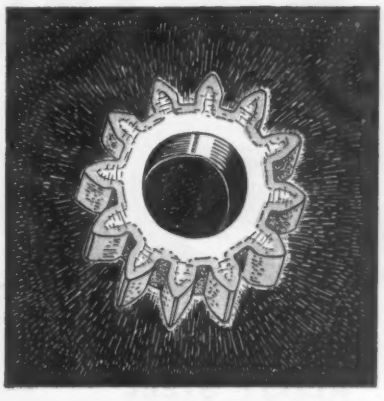
ALL INDUCTION HEATERS ARE NOT ALIKE!

Outstanding features of this new product reflect years of experience of A-C electronic engineers.

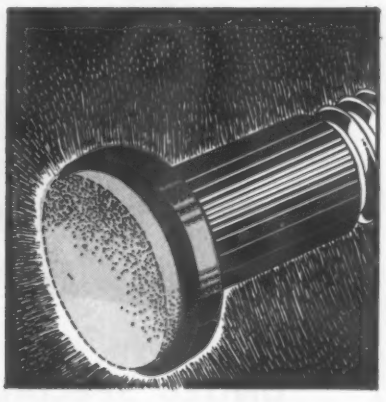
☛ *Here's What it Can Do For You:*



FORGING: Jobs are clean with no scale. No open flame, no furnace heat. Saves dies, offers heat zone control.



HARDENING: Cuts hours to minutes! Gives you hardened surface for long wear, ductile core for strength.



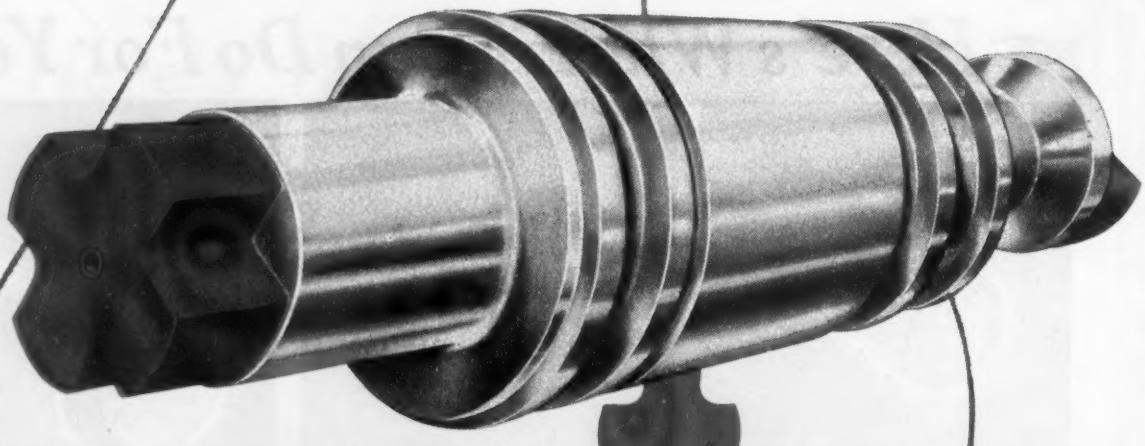
BRAZING: Fast, cheap, clean! Accurate heat control speeds production, insures more uniform results on all units.

TODAY, the big swing is to Induction Heating — and here it is at its newest and finest in Allis-Chalmers new Electronic Heater! With this new production tool many manufacturing operations can now be performed better, faster, cheaper. A-C's Electronic Heater may be the answer to *your* production problems. Send samples for laboratory test. No obligation. ALLIS-CHALMERS, ELECTRONIC DEVICES SECTION, MILWAUKEE 1, WIS.

A 1886

Chalmers MILWAUKEE WISCONSIN

UNITED...
Originators of
Color Branded Rolls



*"UNITED SPECIAL" ALLOY STEEL
(Identified by Red Wabbler)

We believe this to be the most outstanding steel roll available to industry. Heat-treated to specific service requirements, its balanced alloy content assures maximum strength and extremely high wear-resistance. Eight distinct grades are available ranging in hardness from 30 to 55 Shore. Variations of physical properties to meet special conditions are controlled by carbon content, alloying composition and heat treatment. These rolls have an extremely wide application. UNITED engineers will gladly furnish you complete technical data, without obligation, of course.

**One of A Complete Line of 15 UNITED ROLLS Individually Color-Branded for Type Designation*

The 15 principal classifications comprising the UNITED ROLL LINE . . . each one a roll type successfully used in modern industry . . . are individually and distinctively *color-branded* to designate *grade*, *composition* and *service application*. Roll selection is thereby made easy and accurate.

UNITED ROLLS are the product of advanced metallurgical research and more than 40 years experience in roll design and manufacture.

UNITED ENGINEERING AND FOUNDRY COMPANY

Pittsburgh, Pennsylvania

Plants at PITTSBURGH · VANDERGRIFT · NEW CASTLE · YOUNGSTOWN · CANTON

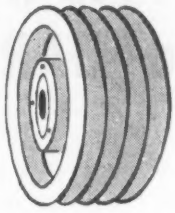
Subsidiary: Adamson United Company, Akron, Ohio

Affiliates: Davy and United Engineering Company, Ltd., Sheffield, England
Dominion Engineering Works, Ltd., Montreal, P. Q., Canada

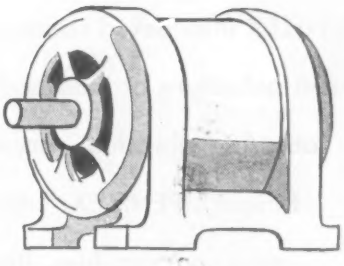
**The World's Largest Designers and Makers of Rolls and Rolling Mill Equipment*

UNITED REG. T. M.

Just like this

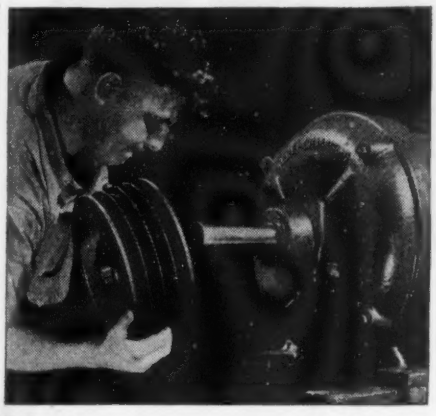
this  goes

on or off this

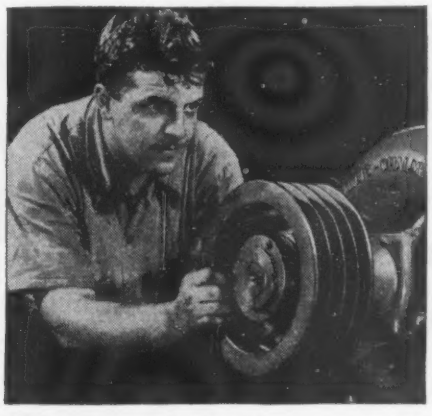


Yes, it's a snap to change sheaves now, when you provide Allis-Chalmers' new "Magic-Grip" — *fastest mounting and demounting sheave on the market.* Saves time and money.

SEE WHY THE NEW "MAGIC-GRIP" MOUNTS FAST, PERFORMS SMOOTHLY



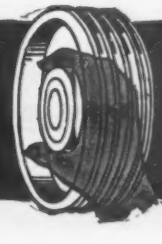
1 Place sheave on shaft. Slides on smoothly because clearance is provided by expanded bushing. There's *no* hammering — *no* forcing! Complete sheave and bushing unit comes intact—ready for quick, easy mounting.



2 Slide to desired position. Sliding easily, sheave can be placed *exactly* according to straight-edge . . . giving you true alignment with resulting smooth performance. A minimum of time is required.

3 Tighten three capscrews — and it's ready to go! Entire sheave is locked securely to shaft and *grips like magic!* No set screws to damage shaft. Send for Bulletin B6310. Allis-Chalmers, Milwaukee 1, Wis.

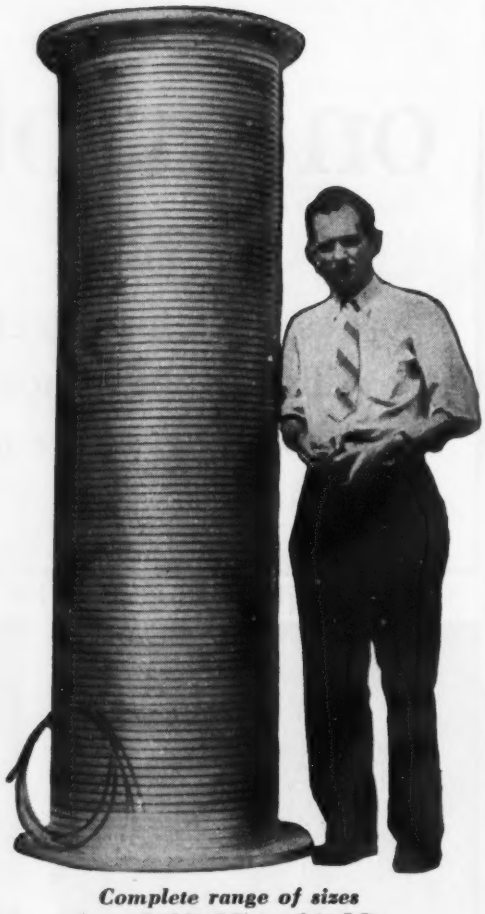
A 1857

Allis-Chalmers Texrope "MAGIC-GRIP"  SHEAVES

PENFLEX

NOW 24" I.D. PENFLEXIBLE INTERLOCKED GALVANIZED STEEL HOSE FOR STATIONARY and MARINE DIESEL EXHAUSTS

PENFLEX Interlocked construction resists pulsations of load and pressure, absorbs vibration, prevents metal fatigue. PENFLEX Interlocked construction provides the flexibility to make quick, easy installations. PENFLEX Interlocked construction with asbestos packing gives you a pressure-tight, trouble-free exhaust connection. PENFLEX 24" Interlocked, the largest hose in the PENFLEX line, has a bending radius of approximately seven times its diameter and a working pressure of 15 to 25 psi. PENFLEX Interlocked construction requires no special tools or heat to bend.



Complete range of sizes from 5/32" I.D. to 24" I.D.

PENFLEX
Hose and Tubing is also available for other flexible connections on Diesel Installations.

PENFLEXWELD
for Fuel Oil and Starting Air.

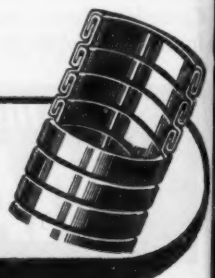
PENFLEX
Interlocked for Lubricating Oil, Circulating Water, Exhausts and Air Intake Lines. Write for Bulletin 71.

PENFLEX METAL HOSE

PENFLEX

PENNSYLVANIA FLEXIBLE METALLIC TUBING CO.

7219 POWERS LANE Established 1902 **PHILADELPHIA 42, PA.**



H-P-M Hydraulic GIANTS FOR INDUSTRY

Realizing the ever increasing need for large presses, H-P-M plants are completely tooled to efficiently produce massive hydraulic presses, as well as smaller sizes. Typical H-P-M "giants" are illustrated below. Many other sizes and types have been built. Each press is completely self-contained, and is powered by the reliable H-P-M oil-hydraulic operating system.

The Hydraulic Press Manufacturing Company is the only builder of completely integrated presses, with press frame, radial pumps, valves and controls built by one company. Undivided responsibility to the user is thereby guaranteed. If your production involves pressure processing, call in an H-P-M press engineer to study your particular requirements. He can probably recommend an H-P-M press already designed, thus saving you time and cost of engineering. Write today, stating your requirements.

THE HYDRAULIC PRESS MFG. COMPANY, Mount Gilead, Ohio, U. S. A

BRANCH OFFICES: *New York, Philadelphia, Cleveland, Detroit and Chicago. Representatives in principal cities.*

A 5000-ton H-P-M FASTRAVERSE rubber pad sheet metal forming press.

A 5000-ton H-P-M FASTRAVERSE magnesium forging press.

A 3000-ton H-P-M FASTRAVERSE, deep sheet metal drawing press.

HPM

All-Hydraulic Self-Contained

FASTRAVERSE PRESSES

For...Coining, Drawing, Embossing, Forging and Trimming

VITREOUS ENAMELING

simplified in production and *reduced* in cost by this

new Titanium Steel

ADVANTAGES

THE use of Titanium steel offers the listed advantages to the Vitreous Enamel Industry. These advantages have been proved in laboratory and plant operation where the recommended practice covering nickel flashing, pickling and enameling has been followed:

1. Elimination of enamel boiling due to steel defects.
2. Elimination of conventional ground coat.
3. Elimination of copper heading.
4. Improved sag resistance.
5. Improved resistance to warping.
6. Excellent deep drawing qualities.
7. Use of conventional cover coats directly on metal.
8. Resistance to hydrogen penetration or absorption.

The benefits you derive from these advantages are: Lighter enamel weights and coats... reduction of chippage and mechanical breakage losses... increase in production efficiency through reduction of rework and re-operation... sharply improved thermal shock resistance of white enamel, due to thinner enamel thickness... overall cost reduction for enameled ware... increase in production speed. Even when a ground coat is used this NEW Titanium Steel for Vitreous Enameling brings important manufacturing cost reductions.

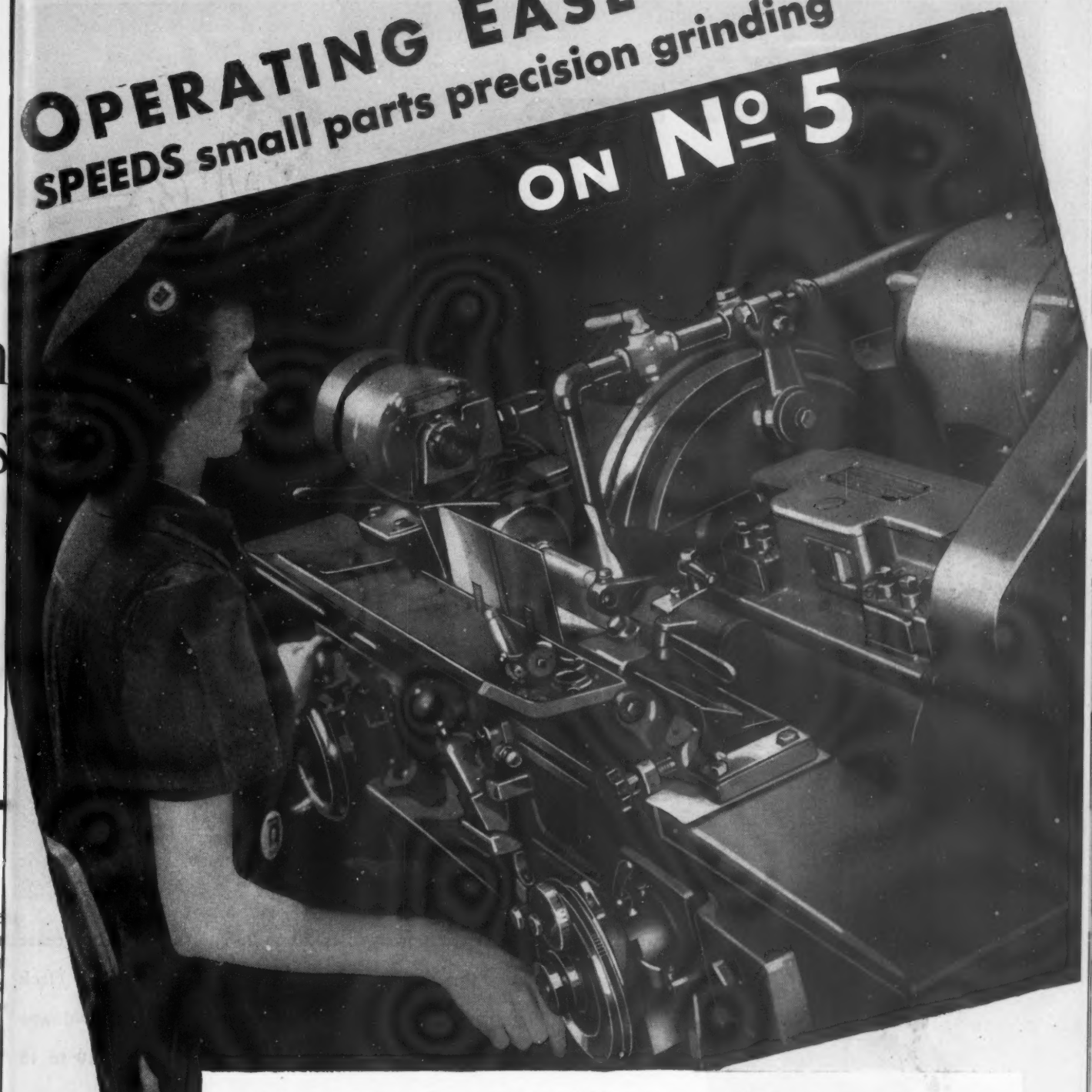
Manufacturers of both steel and enameled products may obtain complete factual technical data from a member of our Technical Staff, or by mail. Consult your steel supplier on deliveries.

Pending patent applications on the new enameling process and product made thereby are owned jointly by Inland Steel Company and The Titanium Alloy Manufacturing Company under Trust Agreement.

THE TITANIUM ALLOY MANUFACTURING COMPANY

Executive Offices: 111 BROADWAY, NEW YORK, N. Y. *General Offices and Works:* NIAGARA FALLS, N. Y.

OPERATING EASE SPEEDS small parts precision grinding ON Nº 5



All controls grouped within convenient reach . . .
Recessed base permits operator to sit comfortably . .
Work loaded, ground and unloaded with minimum of motion, time and effort . . .
. . . and with the resultant *fast* production users get **high accuracy** — on many jobs to .0001" limit.

J·E

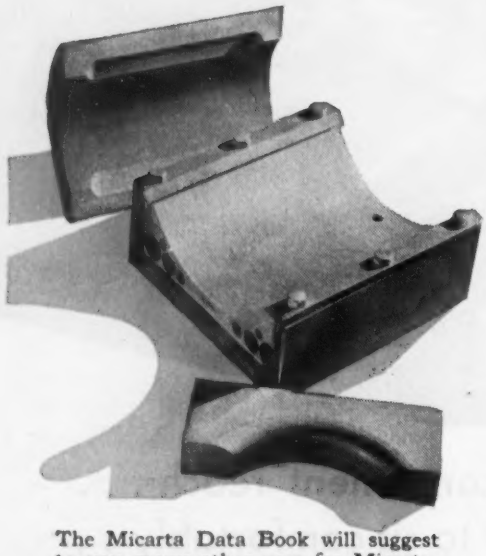
Investigate No. 5 Plain Grinding Machine's **profitable** features for your close-tolerance grinding of small cylindrical work.

BS **BROWN & SHARPE MFG. CO.**
Providence 1, R. I., U. S. A.

BROWN & SHARPE

Steel Men have stamped OK

on MICARTA Roll Neck Bearings



The Micarta Data Book will suggest to you many other uses for Micarta, the plastic for steel mills. It's light, strong, tough and smooth, and easily machined with ordinary tools. Ideal for bearings, bushings, gears and other parts that have to stand hard wear.

And it really takes something to earn a steel operating man's approval. In these tough war years, they have learned how important it is to have bearings that stand up in hard service.

Micarta Roll Neck Bearings are made by Westinghouse...engineered by men who have made it their business to know steel and what it takes to make steel at a profit.

Micarta bearings cut power costs 20 to 25%...save all the grease expense—because they are water-lubricated. Micarta Roll Neck Bearings hold gauge . . . saving time wasted on frequent screw-downs and test bars—protect roll necks against scoring, and last 10 to 15 times longer than metal bearings.

No wonder these dependable roll neck bearings are doing their job on more than 3,000 stands of rolls today!

Write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-06383

WESTINGHOUSE

Micarta

HEADLINES and HEADLINERS

*
More Straphangers
War-Weary Trolleys, Buses Must Carry Even Greater Throngs in '45
Some Equipment Laid Up But Most in Fair Shape—Manpower Critical Problem
A Survey of 23 Key Systems

F. E. HAKER, *Director of Purchases,* Allis-Chalmers Manufacturing Company

"A FIRM such as Allis-Chalmers has its roots in many diversified industries. We must know what is happening in those industries in order to plan our own activities intelligently. That is why not only I, but most of our executives, read The Wall Street Journal thoroughly every day. It gives us, in comprehensive, digestible form, all the business and industrial news of the United States and the world at large. In short, it's our listening post!"

F. E. Haker

*Like most important business news, this story appeared first in The Wall Street Journal. That's why this national daily is "must" reading for business men who need to be fully, accurately and quickly informed. And that's what provides such an unusually responsive audience for advertisers.

The **ONLY** *National Business Daily*
Published simultaneously on both coasts

90" *Niles Wheel Lathe being* Engineered Rebuilt *by Simmons for one of the country's leading railroads. In foreground, dismantled parts of a similar lathe.*

WHILE retooling for peacetime production awaits only the go-ahead signal to put your blueprinted ideas to work, don't overlook the nucleus of your future production—the overworked machine tools right on your floor, the equipment that must be restored to peak efficiency for economical and profitable operation.

Leading manufacturers are already anticipating this need, taking "physical inventory" of their basic equipment and initiating systematic *Engineered Rebuilding* programs by Simmons.

Engineered Rebuilding goes beyond the mere restoring of a tool to originally designed capacity. Simmons techniques build in new utility and labor-saving devices. Beds and tables are lengthened, housings widened, and special motors and gear transmissions added where necessary.

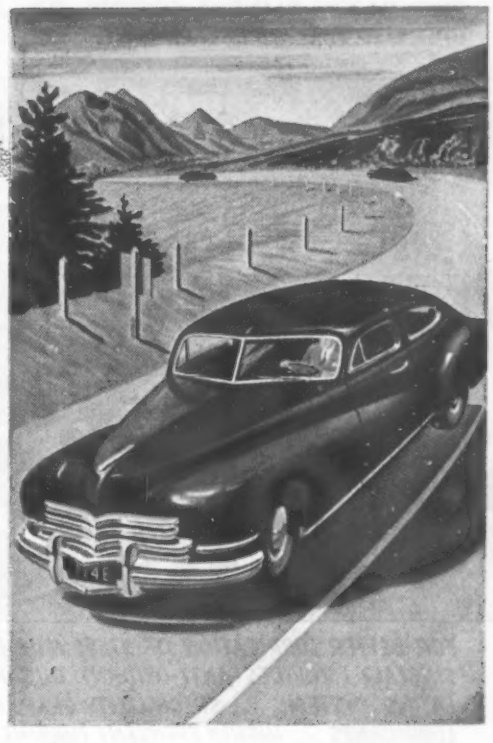
A new edition of "The Simmons Way" is just off the press. It will answer your questions about the ways and means of *Engineered Rebuilding.* Write for your copy today.

SIMMONS MACHINE TOOL CORPORATION
1755 NORTH BROADWAY, ALBANY 1, NEW YORK

SIMMONS MANUFACTURERS OF STANDARD AND SPECIAL-PURPOSE MACHINE TOOLS • ENGINEERED REBUILDING

BONDERIZING

IS ESSENTIAL PROTECTION FOR A MULTITUDE OF PRODUCTS



Because they started out with Bonderizing under the finish, millions of pre-war cars, 3 to 10 years old, have been demonstrating to car owners the extra finish value of Bonderizing.

Bonderizing will be back on the new cars, providing bodies, hoods, fenders with a rust-inhibiting surface that *bonds* the final finish to the metal, prevents the spread of rust from scratch or mar.

Bonderizing will be back, too, on a multitude of other sheet steel products, giving them the extra value of *lasting* fine appearance that means superior quality to the customer when the dealer says, "It is Bonderized."

PARKER RUST PROOF COMPANY

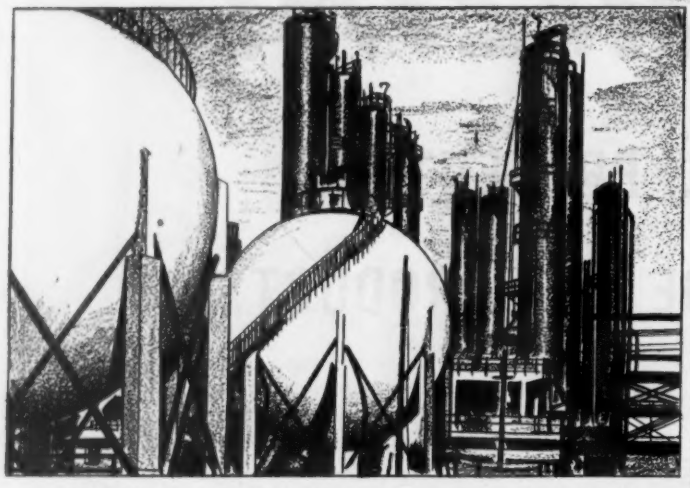
2158 E. MILWAUKEE AVE. • DETROIT 11, MICHIGAN

BONDERIZING **HOLDS PAINT TO STEEL** • ***PARKERIZING*** **INHIBITS RUST** • ***PARCO LUBRIZING*** **RETARDS WEAR**

PARKER PRODUCTS CONQUER RUST

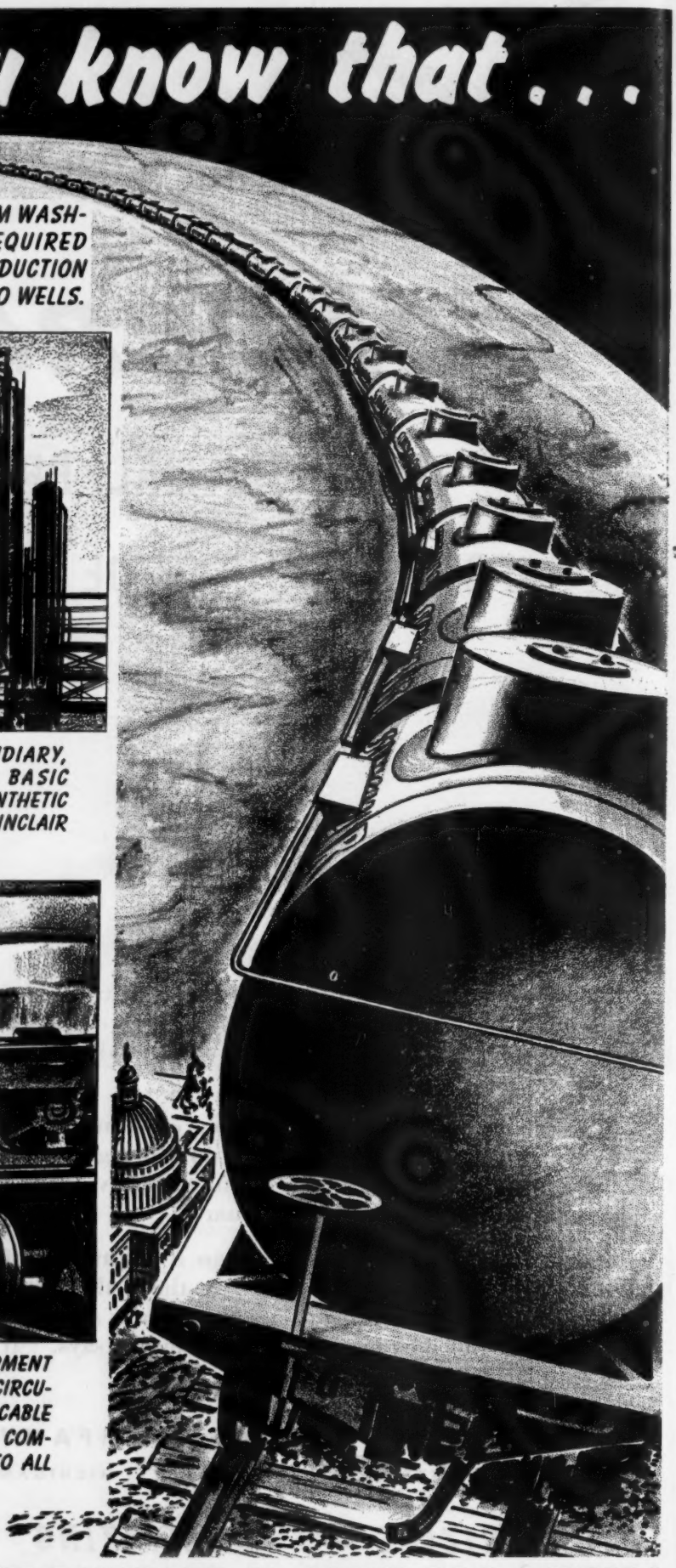
Do you know that . . .

A TANK CAR TRAIN STRETCHING FROM WASHINGTON TO QUEBEC WOULD BE REQUIRED TO CONTAIN A SINGLE YEAR'S PRODUCTION OF CRUDE OIL FROM SINCLAIR'S 8000 WELLS.



SINCLAIR RUBBER INC., A SINCLAIR SUBSIDIARY, MANUFACTURED IN ONE YEAR SUFFICIENT BASIC MATERIAL TO PRODUCE 78,000 TONS OF SYNTHETIC RUBBER. THIS PLANT AT HOUSTON, TEX., IS SINCLAIR OPERATED FOR THE GOVERNMENT.

FOR BETTER LUBRICATION OF STEEL MILL EQUIPMENT SINCLAIR PROVIDES ANTI-OXIDANT OILS FOR CIRCULATING SYSTEMS . . . SPECIALIZED GEAR AND CABLE LUBRICANTS . . . HIGHLY EFFICIENT TURBINE AND COMPRESSOR OILS . . . BEARING GREASES SUITED TO ALL OPERATING CONDITIONS.



SINCLAIR IS EQUIPPED TO SERVE YOU BETTER!

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

ALL-GREEN WIRE ROPE IS TRU·LAY PREFORMED I.P.S.*

EXCLUSIVE NEW GREEN LUBRICANT LENGTHENS LIFE OF THIS SUPERIOR ROPE

THE WORLD'S BEST ROPE MADE STILL BETTER

● Hundreds of field tests, confirmed by scores of laboratory tests, prove this new green lubricant has greater adherence with the result that the wires it covers wear longer, give increased service. So now, every strand of **TRU·LAY** Preformed made of Improved Plow Steel* is literally "stuffed" with this superior lubricant.

ACCO

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Bridgeport, Conn.

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

MOTOR FRAME — Three rings are inserted inside a fourth ring by shrink fitting and welding operations to save internal machining costs. Outer Ring: 17⅛" OD x 16⅝" ID x 13¾" wide.

OCTAGONAL MOTOR FRAME—9½" OD x 8" ID x 4⅝" wide (¾" wall). Dresser rolls and welds this unusual shape.

Reduced Sections • Accurate Rolling

Save machining costs

on these electric motor parts

MOTOR-BEARING BRACKET—Ring, 10⅞" OD x 9⅛" ID x ⅞" wide; End Disc: 10¼" OD x 3¼" ID x ⅜" wide. Dresser fabricates the complete weldment.

LARGE MOTOR-GENERATOR SET FRAME—17" OD x 16" ID x 36¾" wide. Dresser rolls and welds frame, cuts openings, welds feet.

SMALL MOTOR-GENERATOR SET FRAME with angle iron feet. 11" ID x 9⅞" OD x 10¼" wide. A routine job at Dresser!

The electric motor parts illustrated here are typical examples of how Dresser saves material and machining costs in the production of many unusual circular shapes. Produced by other methods, extensive machining formerly was necessary to arrive at the desired dimensions.

Dresser-fabricated, rough dimensions are more accurate—thus reducing and often eliminating machining to reach final dimensions. Inner ring construction (see round motor frame, top left) wherever applied, saves additional material and internal machining.

For almost three-quarters of a century, Dresser has been making products which demand accurate fabrication through rolling, welding and sizing many circular shapes—setting new standards of accuracy, strength and economy. This experience, plus complete facilities for quantity production of rings of varied section and size, now are available to help you meet competition with better products and lower costs.

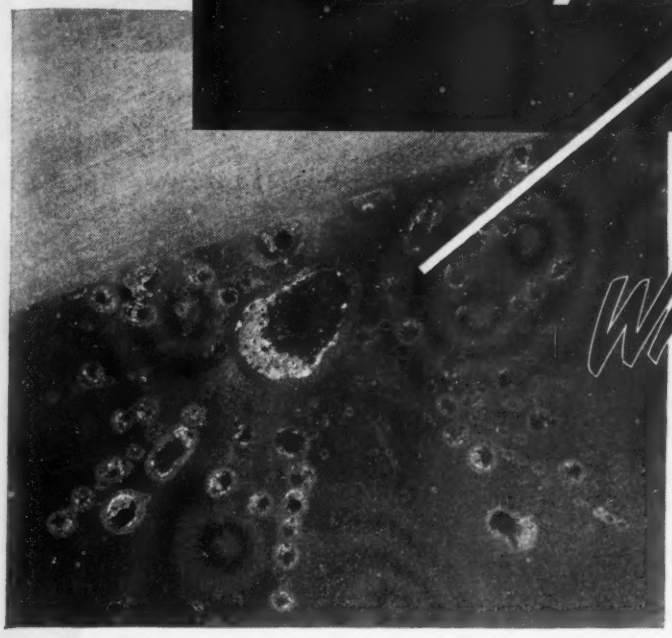
Send us your inquiry, or write for the booklet SJ "RINGS FOR WAR".

DRESSER MANUFACTURING DIVISION
Bradford, Pa.

DRESSER RINGS and FORGINGS

ONE OF THE DRESSER INDUSTRIES

Source of $100,000,000 Damage



What's your share?

$100,000,000—that's just a conservative estimate of the annual losses caused by RUST.

Look at your records...see how much money *your* company has been penalized by this costly waste.

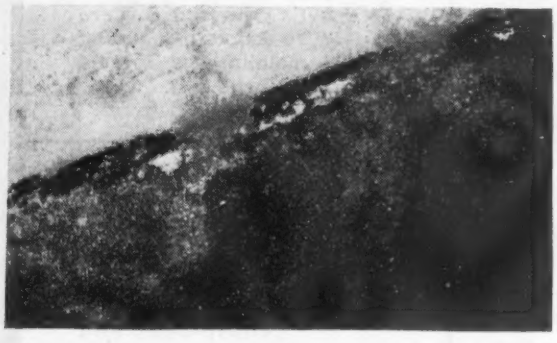
Adequate precautionary anti-rust measures *can* minimize or completely eliminate rust destruction.

Cities Service Rust Remover is an unexcelled first-step in plant-protection. This fast-acting liquid dissolves rust from iron or steel and removes tarnish from aluminum, brass, copper and other non-ferrous metals. Simple to apply, easy to remove.

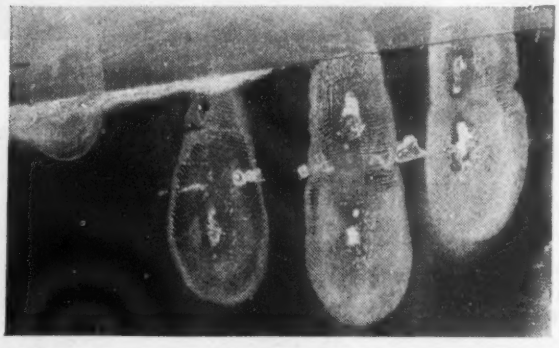
After cleaning, let your Cities Service engineer show you how to protect and preserve the cleaned metal surfaces with a special coating of Anti-Corrode.

Cities Service will be glad to study your plant operations and recommend a complete rust-prevention program without obligation on your part. You may avoid considerable trouble and expense. Call in a Cities Service expert today.

Rust caused by water from a leaking or "sweating" overhead pipe. Upper left portion was quickly cleaned with a cloth dampened with Cities Service Rust Remover.



Result of storage of raw steel stock subject to a humid atmosphere. Note that rusting has developed in a uniform layer. Upper half of plate was cleaned in 50 seconds with Cities Service Rust Remover.



Action of rust on sheet steel caused by finger marks in handling. Upper section has been cleaned with soft cloth dampened with Cities Service Rust Remover.

Mail this Coupon *Today*

CITIES SERVICE OILS
ONCE-ALWAYS

Cities Service Oil Company
Room 354, 70 Pine Street,
New York 5, N. Y.

Gentlemen: Please send me further information on your Rust Prevention Program.

Name .....

Title .....

Company .....

Address .....

City ..... State .....

8 Superior Features

OF GRANITE CITY SUPERBOND STAINLESS-CLAD STEEL

SUPERBOND STAINLESS-CLAD STEEL HAS HUNDREDS OF USES

Acid Tanks • Tubs
Conveyors • Chemical
Kettles • Drums • Stills
Fume Stacks • Linings
Pressure Vessels • Tank
Cars • Cooking Utensils
Sinks • Cabinets
Storage Tanks of all kinds
Laboratory Equipment
Building Fronts and
Trims • Fountain and
restaurant equipment
Truck Bodies • Bumpers
Accessories

Permanent Bond

After 10 years of experience Granite City Steel Company has obtained a permanent bond that allows no separation of clad even after fracture or severe bending.

Greater Heat Diffusion

SUPERBOND'S mild steel backing rapidly and uniformly dissipates heat with 8 times the conductivity of solid stainless steel. For retorts—kettles.

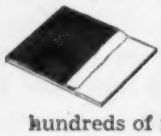
Easily Formed

SUPERBOND Stainless-Clad Steel is easily formed, drawn, punched, beaded and fabricated. You can use the same presses and dies for mild steel.

Economy

The mild steel backing to the stainless steel gives your products the added sales value of stainless quality at much reduced costs.

Corrosion-Resistant



Its bright, stainless steel surface that won't rust or tarnish, offers corrosion resistance to hundreds of reagents that range from Acetic Acid to Zinc Sulphate.

Tailor Made

Steel to perfectly fit *your* job is guaranteed by the new and modern laboratory, run by practical metallurgists, located in the heart of the mill.

Strength

The tensile strength is as high or higher than the proportionate strength of the two metals. Withstands cold bending through an angle of 180°.

Service

Granite City Steel Company is built to serve customers. Large enough to have modern equipment and methods—small enough for fast, accurate service.

Granite City Steel Company

Granite City, Illinois

Chicago • Cleveland
Denver • Houston
Indianapolis • Kansas
City • Los Angeles

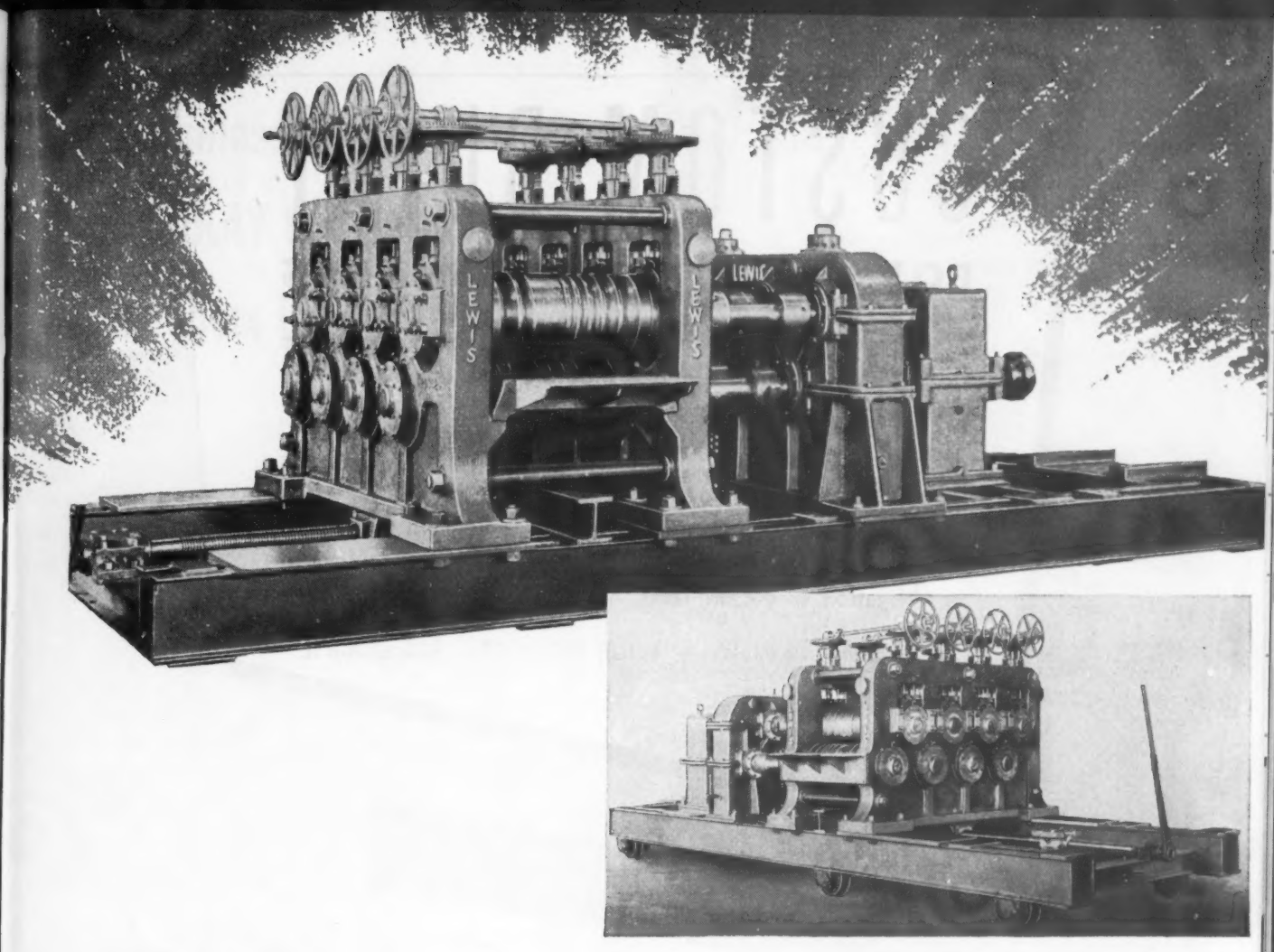
SINCE
GRANITE CITY STEEL
1878

Louisville • Memphis
Milwaukee • Minneapolis • Moline • New
York • St. Louis

Send for this Booklet

which contains complete information and technical data on SUPERBOND Stainless-Clad Steel.

HOT ROLLED SHEETS • COLD ROLLED SHEETS • STRIPLATES • STAINLESS-CLAD • TIN PLATE • TERNE PLATE • ELECTRICAL SHEETS • TIN MILL PRODUCTS • PORCELAIN ENAMELING SHEETS



LEWIS STRAIGHTENING MACHINES

Are Helping to Speed the Russian Steamroller

Because Russia wants the best in modern machines and materials her technical experts have called upon Lewis for thousands of tons of Rolling Mill Equipment.

Among recent shipments to the U.S.S.R. are the 18-inch Straightening Machines shown above. One is stationary while the other is a shuttle type which can be moved in and out of the "line" as required. Both have a maximum capacity of 4-inch rounds, and both are of exceedingly rugged and foolproof construction.

ARMY ★ NAVY

6 plants of Blaw-Knox Company have been awarded the Army-Navy "E" for excellence

LEWIS FOUNDRY & MACHINE

DIVISION OF BLAW-KNOX COMPANY, PITTSBURGH, PA.

CUSTOM BUILT

FOR *YOUR* REQUIREMENTS

Your product is engineered to exacting requirements. The box or crate which encloses it should be custom built to the specific needs of your product alone.

SUPERSTRONG boxes—"Bound With Steel"—possess the required adaptability for a wide variety of products—large or small. Our engineering department can design your shipping container for strength, for utility, for economy. No cost or obligation to get the facts.

Write for our free booklet—"YOUR PRODUCT . . . how to ship it."

SHIPPING TRADE SUPERSTRONG MARK CONTAINERS REG. U.S. PAT. OFF.

RATHBORNE, HAIR AND RIDGWAY COMPANY

1440 WEST 21st PLACE • CHICAGO 8, ILLINOIS

Making Stainless Steel Electrodes is a McKAY Specialty . . . Using them is yours!

Here is a Helpful Booklet About *Welding Stainless Steel*

McKay Stainless Steel Welding Electrodes are "tops" in quality. There are good reasons for this leadership.

Among these are the standard McKay practices of: (a) Continued research in the Mellon Institute at Pittsburgh, Pa., as well as in our own laboratory at York, Pa.; (b) Analyses and correct selection, before coating, of *all* core wires; (c) use of *either* Titania or Lime Coating as preferred by you . . . not just one coating for all grades; (d) Every "batch" pilot tested before production; (e) production runs crack tested, pad analyzed, weld metal analyzed, physically tested . . . or all of these if necessary . . . to *prove* quality; (f) Exact analysis stamped on each package and certified upon request. These precautions, plus most modern production facilities, assure you of complete uniformity and successful performance.

You can weld better with these better electrodes! To test your knowledge of practical stainless steel metallurgy, ask for your free copy of the new booklet, "Things to Know About Welding Stainless Steels."

TRY YOUR HAND AT THESE QUESTIONS ABOUT STAINLESS STEEL

		TRUE	FALSE
14.	A stainless steel electrode operated on reverse polarity sends its metal droplets across the arc against the stream of the electrical current.	☐	☐
15.	When welding stainless steels a short arc is preferable to a long arc.	☐	☐
16.	In order to be certain of the alloy content of welds the user of stainless electrodes should specify the analysis of the electrode core wire.	☐	☐

ANSWERS: 14. True; 15. True; 16. False.

Questions 1 to 13, inclusive, have appeared in preceding advertisements.

General Sales Office: York, Pa.

THE McKAY COMPANY
PITTSBURGH, PA.

WELDING ELECTRODES . . . COMMERCIAL CHAINS . . . TIRE CHAINS

Your "Product of Tomorrow"—

how are you planning to make it

✔STRONGER
✔LIGHTER
✔LONGER LASTING
✔BETTER LOOKING
✔LOWER IN COST
✔EASIER TO SELL

WHETHER you're designing freight cars or toy wagons, electric furnaces or electric toasters, steam shovels or garden spades, the basic criteria for selecting the materials you use are *suitability, availability* and *maximum economy.*

On all three counts, steel will fill the bill most often. Steel can provide strength far beyond the limits of other materials, old or new. It can withstand the severest range of temperatures or pressures. It will reduce weight safely at lowest cost. It offers high resistance to corrosion, to fatigue, to impact, shock and abrasion.

Steel can be deep drawn, forged, formed, cut, bent and twisted. You can weld it to perfection, rivet, punch and even stitch it. You can polish it to mirror surface, paint or permanently coat it with porcelain enamel. What other material can be had in so many different forms, or with such widely different properties?

Finally, the use of steel involves no unfamiliar fabricating or manufacturing problems. And, on the basis of performance, steel generally costs less.

What amounts to a revolution in the manufacture of steels for severe service has recently taken place.

The research concentrated on the developments of the weapons of war has paid off big in discovering, and proving in service, hitherto unsuspected properties of special purpose steels. They open to the designing engineer entirely new fields of application, not only eminently practical, but almost unlimited in their golden possibilities.

CARNEGIE-ILLINOIS STEEL CORPORATION
Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Supply Company, Chicago, *Warehouse Distributors*
United States Steel Export Company, New York

9 TIMES OUT OF 10 STEEL WILL DO IT BETTER

U·S·S STAINLESS AND HEAT-RESISTING STEELS to assure high resistance to corrosion and heat, and to reduce weight.

U·S·S CARILLOY ALLOY STEELS—Special steels for the special jobs of industry.

U·S·S HIGH STRENGTH STEELS to resist corrosion and increase strength without adding weight.

U·S·S COPPER STEEL to give at least twice the atmospheric corrosion resistance of regular steel at little additional cost.

U·S·S ABRASION-RESISTING STEEL to combat wear and friction.

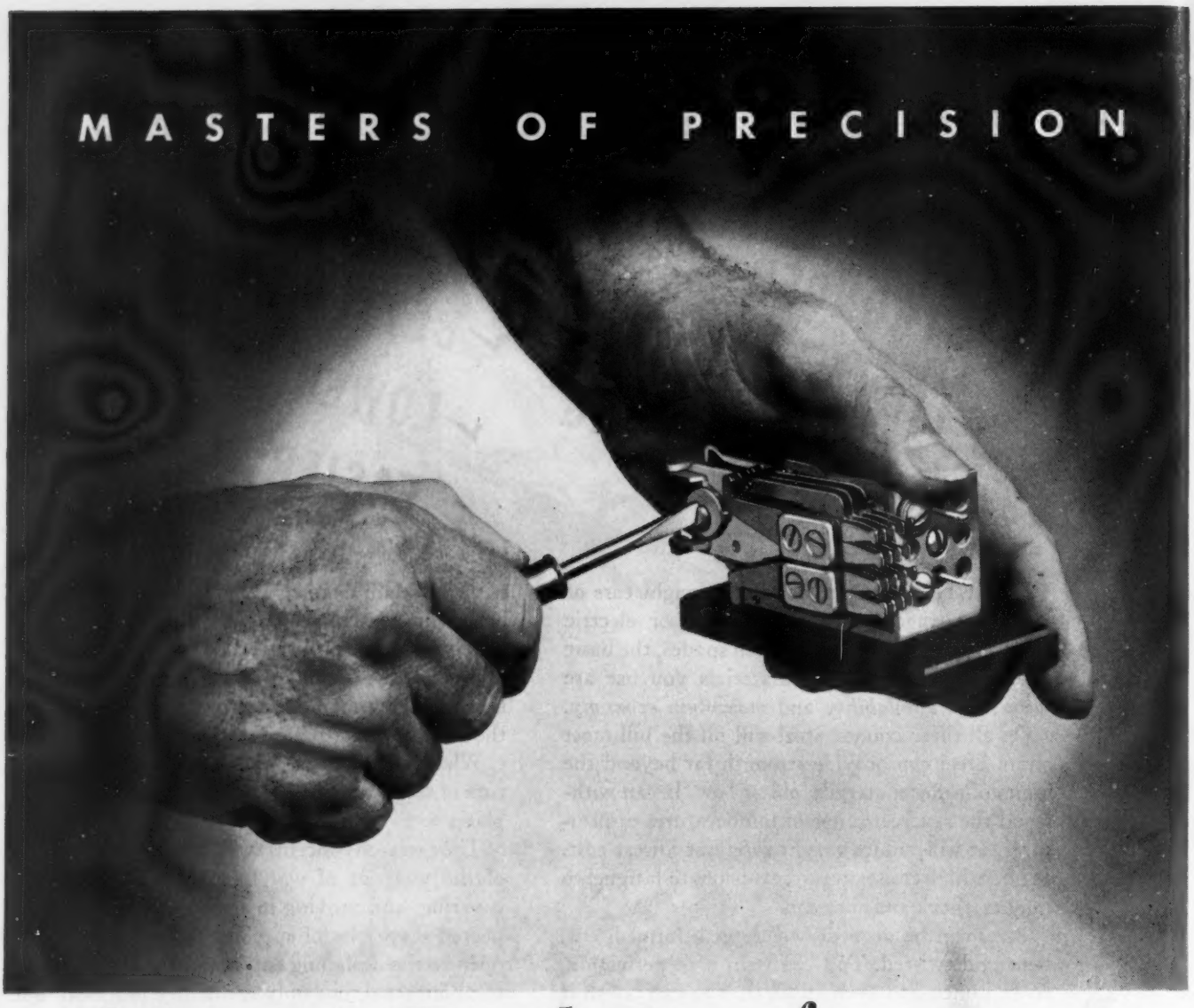
U·S·S HOT-ROLLED AND COLD-ROLLED STEELS to provide the basic advantages of steel, plus maximum economy in accordance with the needs of each job.

U·S·S PAINTBOND—A galvanized, Bonderized sheet that permits immediate painting and holds paint tighter.

U·S·S VITRENAMEL — Sheets designed especially for porcelain enameling.

U·S·S ELECTRICAL SHEETS for motors, generators and transformers.

UNITED STATES STEEL



Meeting Rigid Specifications for Dependable Metals

Producing "tailor-made" metals for products built to exacting standards is everyday procedure for Western Brass Mills. One of these metals, Super-X Nickel Silver, is meeting many rigid individual specifications for a wide variety of vital functional uses.

If your needs call for an alloy that can be blanked, drawn, spun, formed, machined or pierced, use Super-X Nickel Silver.

Our mills are conveniently located at East Alton, Ill. and New Haven, Conn. We would appreciate an opportunity to discuss your requirements for Nickel Silver and other copper-base alloys.

Super-X NICKEL SILVER
WESTERN BRASS MILLS

WESTERN BRASS MILLS

DIVISION OF OLIN INDUSTRIES, INC.

East Alton, Illinois

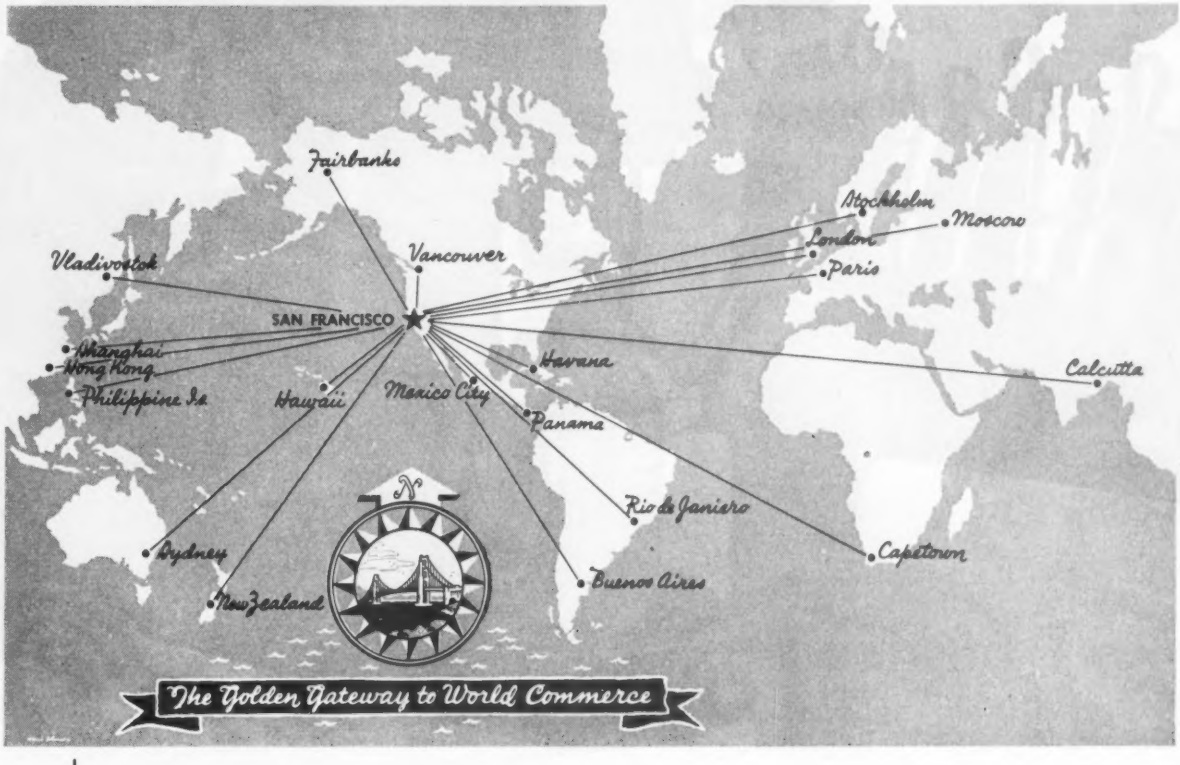
DIVISION OF OLIN INDUSTRIES INC.

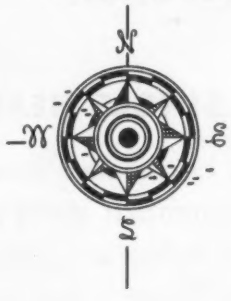
BRASS • BRONZE • PHOSPHOR BRONZE • NICKEL SILVER • COPPER

Experience Counts

IN THE EXPORT FIELD

We offer an experienced Export Service ready to introduce your products to the markets of the world





It's not too early to be making plans, *real* plans, for the great export trade that will be the life of American business tomorrow. Already many ports are open to world commerce. Others are opening rapidly. For the present . . . for the future . . . your foreign trade connections are of prime importance.

We offer the service of an export organization thoroughly familiar with world markets. We maintain a staff of engineers and international trade consultants who, through extended foreign residence and world-wide trade connections, are soundly established in the export field. We suggest that these experts, with their years of experience, are equipped to serve you in foreign markets most efficiently and economically. Remember, *experience counts in the export field.*

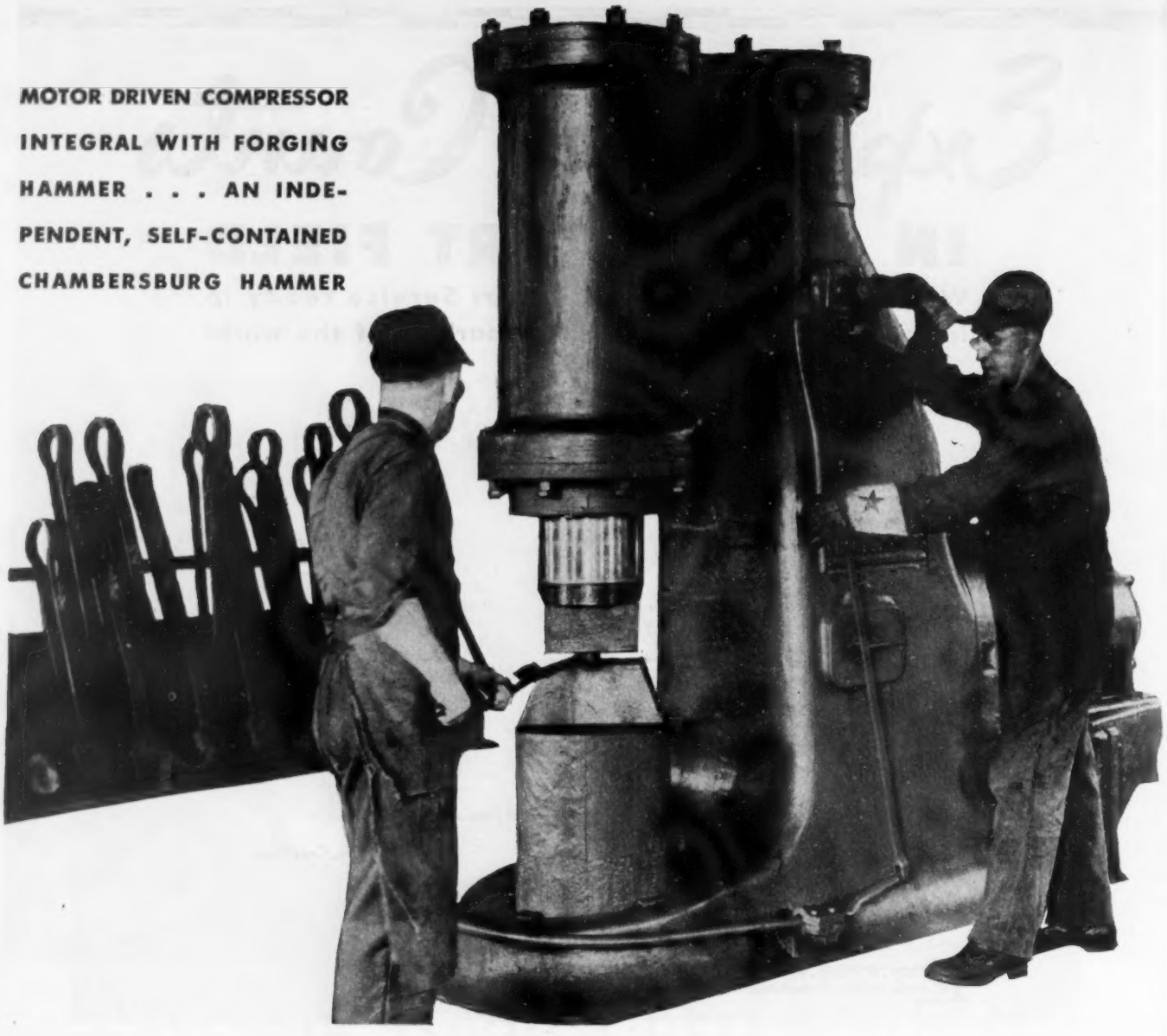
For analysis of foreign markets or for representation in international trade, your correspondence is invited.

Reeder *International*

IMPORTERS & EXPORTERS

100 Sacramento Street
San Francisco 11, California, U. S. A.

EXPORTERS OF: STEEL • BUILDING MATERIALS • MACHINERY • STEEL PRODUCTS • TOOLS • CANNED GOODS • TEXTILES • METAL FURNITURE • OFFICE SUPPLIES



MOTOR DRIVEN COMPRESSOR INTEGRAL WITH FORGING HAMMER . . . AN INDEPENDENT, SELF-CONTAINED CHAMBERSBURG HAMMER

"AN UNUSUAL AMOUNT OF FORGING WORK DONE IN A SINGLE HEAT"

THE Chambersburg Pneumatic Forging Hammer shown above is operating in the Locomotive Shop of a well known railroad.

The shop supervisor states the flexibility and speed of operation permit an unusual amount of forging work to be done in a single heat. Also the necessity of running a steam line to the blacksmith shop is avoided as it plugs into the nearest electric outlet. It can be located wherever convenient. It starts instantly and strikes a constant number of blows, heavy or light, at the will of the operator. A new bulletin, No. 1275, is now ready.

CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.

CHAMBERSBURG

HAMMERS · CECOSTAMPS · PRESSES

"Sunday Punch" that Travels 15 Miles!

When "Long Tom"—155 mm. heavyweight of the battlefront—hurls his 95-pound shell at an enemy 15 miles away, he delivers the "Sunday Punch" of our hard-hitting field artillery. And he throws 3 of these long-range, knock-out punches a minute.

Yet with all of its striking power, this gun is highly mobile, especially when mounted on a Sherman tank chassis, as pictured below.

Because of the tremendous pressure and strain generated upon firing, "Long Tom" barrels and breech blocks are made of the finest steel obtainable—Electric Furnace Steel. Made to exacting specifications, much of this steel has come from Republic.

Republic Electric Furnace Steels top the list for strength and toughness—and for favorable strength-to-weight ratio. And the close control possible only in electric furnace melting keeps them *ALWAYS* "on target," enabling them to hit predetermined specification marks smack on the nose.

These steels are as *CLEAN* and *SOUND* as the most expert furnace practice can make them. They are *consistently UNIFORM*—in physical, chemical, hardenability and performance values. They are free from imperfections which might initiate cracks and lead to dangerous failures. And they are free from practice-upsetting variables—thus insuring full benefits from mass production.

Republic—world's leader in this field of steel making—is ready NOW to help you improve the quality of your peacetime products and cut manufacturing costs with Republic Electric Furnace Steels. Write to:

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Bldg., New York 17, N. Y.

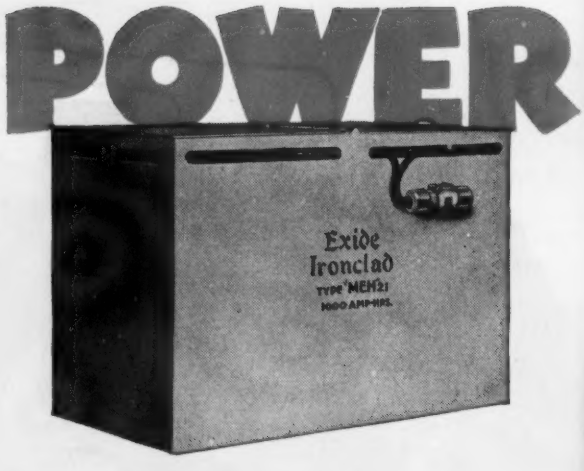
Signal Corps Photo

REPUBLIC
—Leader in the Production of
ELECTRIC FURNACE STEELS
"QUALITY" steels . . . alloy . . . stainless

There is no slowing down between shifts when unit loads are handled by Exide-powered electric trucks. Lifting, carrying and stacking progress smoothly and dependably, hour after hour, for when Exides supply the motive power sustained speeds are assured straight through to the end of the day.

In plants and warehouses throughout the country, Exide-equipped electric trucks are expediting materials handling, conserving manpower, and cutting costs. Exides are amply provided with the extra power required for today's exacting needs. And their rugged construction keeps them steadily on the job. For dependability, long-life and ease of maintenance, you can always count on Exide Batteries.

Write us for a FREE copy of the bulletin "Unit Loads," prepared by The Electric Industrial Truck Association. It tells how to cut handling costs up to 50% ... covers latest developments in materials handling ... and includes actual case histories.



THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

Eliminate

inventory loss

due to rust

use **Weirzin**

Electrolytic Zinc Coated Sheets and Strip

assures a better product at a lower net cost

Weirzin's high rust resistance gives you a big edge in competition.

It means a substantial saving in (1) inventory loss, (2) pickling, (3) cleaning, (4) buffing, (5) handling.

It also means a far superior and more saleable finished product produced at a lower net cost.

Weirzin offers you an unusual combination of manufacturing advantages—advantages that represent a head start in post-war business—advantages fully described in our new technical bulletin . . . Write for your copy and a test sample.

WEIRTON STEEL CO.

WEIRTON STEEL COMPANY

WEIRTON, W. VA. *Sales Offices in Principal Cities*

Division of NATIONAL STEEL CORPORATION *Executive Offices, Pittsburgh, Pa.*

9 INCH
SOUTH BEND
Precision
LATHE

. . . . FOR THE MANUFACTURE OF SMALL ACCURATE PARTS IN PRODUCTION SHOPS . . FOR PRECISION OPERATIONS IN TOOLROOMS, EXPERIMENTAL SHOPS, AND LABORATORIES

9 INCH MODEL A

SOUTH BEND LATHE FEATURES

Fine workmanship by experienced machine tool craftsmen.

Superfinished spindle with large bearings.

Direct belt drive to spindle for smooth, quiet operation at high speeds.

Back-geared drive for heavy cuts and low spindle speeds.

Full quick change gear mechanism.

Thread cutting range—4 to 224 per inch, right hand and left hand, 48 pitches.

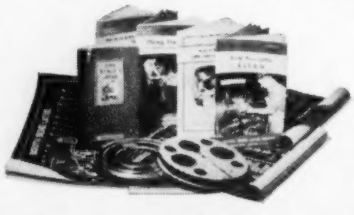
Precision lead screw for thread cutting.

Worm drive and friction clutch for power longitudinal feeds and power cross feeds.

Three hand-scraped V-ways and one flat way on the bed insure perfect alignment of headstock, saddle, and tailstock.

Whether your problem is the quantity production of small, accurate parts, or the efficient machining of small work in the toolroom, experimental shop, or laboratory, you will find a lot of possibilities in the 9-inch South Bend Lathes. Modern in design, built with the same care as the larger sizes of South Bend Lathes, they are fast, accurate, and versatile. Substantial savings in capital investment, power consumption, floor space, and labor costs have often resulted from their installation.

In addition to the 9-inch Lathes, we manufacture 10″, 13″, 14½″, and 16″ lathes in Quick Change Gear and Toolroom types. Also the Series 900 and Series 1000 Precision Turret Lathes having ½″ and 1″ collet capacity respectively. Write for a catalog, stating the size and type of lathe you need.



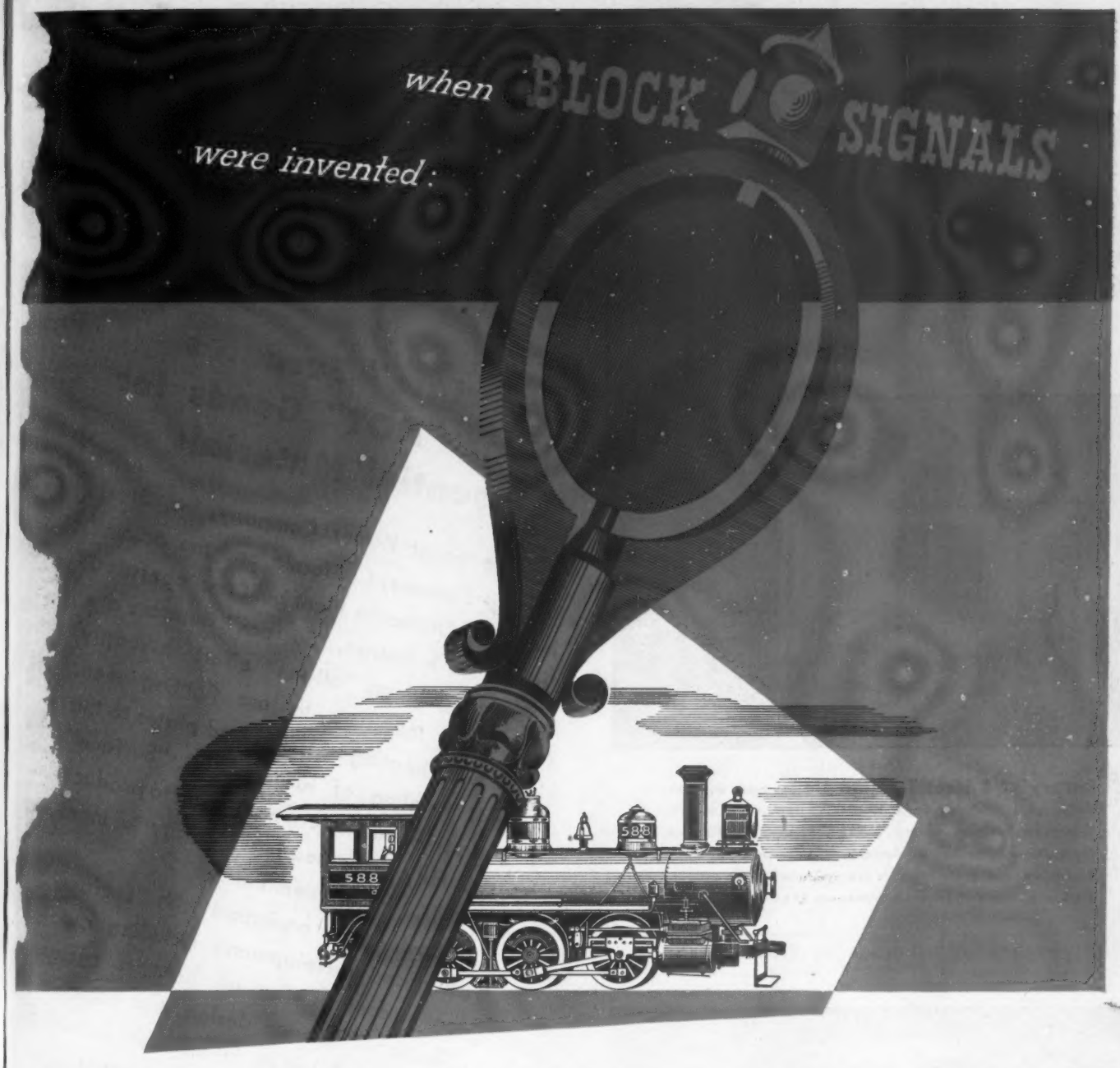
TRAINING HELPS

Sound films, operator's handbooks, wall charts, booklets, and bulletins on lathe operation and care are available for training new lathe operators. Write for Bulletin No. 21-D for full information.

ARMY E NAVY

SOUTH BEND LATHE WORKS

429 E. MADISON ST. • *LATHE BUILDERS FOR 38 YEARS* • SOUTH BEND 22, IND.



Freedom Forge—now "Standard Steel"—had one of the three Bessemer Installations in the United States

The automatic block signals that make railroad travel safe today, and have contributed so much to the working of transportation miracles, started long ago . . . in 1867. And in that same year, Freedom Forge—even then 72 years old—installed another new development to serve the railroads.

In a stone building still standing today, Freedom Forge installed two new 5-ton Bessemer Converters . . . the third plant in the country. A rail mill, and a tire mill with a double-acting 10-ton hammer, imported from England, were put into operation.

Throughout the intervening years, this pioneering has continued. The 150 years of experience that started with Freedom Forge is available to solve your forging and casting problems. "Standardize on Standard" is a proven way to be sure of satisfaction. The Baldwin Locomotive Works, Standard Steel Works Division, Burnham, Pa., U.S.A. Offices: Philadelphia, New York, Boston, Washington, Cleveland, Detroit, St. Louis, San Francisco, Houston, Pittsburgh, Chicago.

BLW THE BALDWIN GROUP

BALDWIN

STEEL FORGINGS & CASTINGS

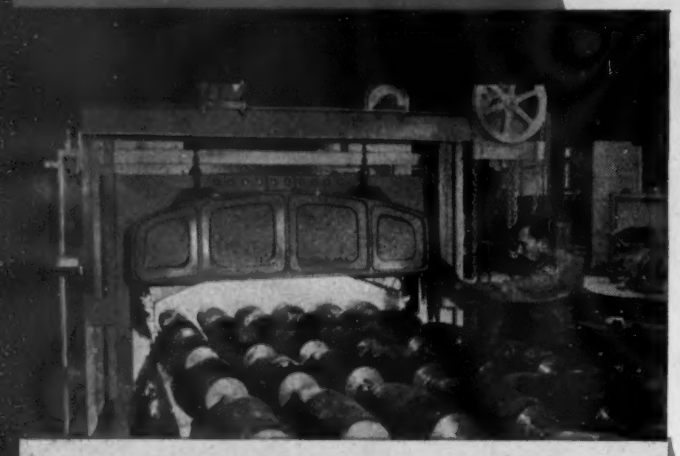
HEATING CAPACITY.. BIG TONNAGE

"Surface" Furnaces Deliver "HOT" Goods for Essential Materials

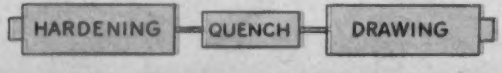
● In the great Kaiser Company, Inc. Steel Plant at Fontana, California and the adjoining Army Ordnance Plant built and operated by Kaiser Industries, "Surface" furnaces are operating in an "all-out" effort to supply essential materials to our fighting men. From the heating of billets and plates to the heat treating of large shells, "Surface" has provided modern equipment to produce unusually large heating capacity to meet BIG TONNAGE demands.

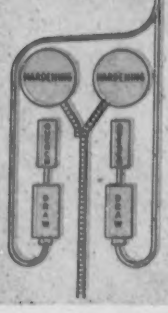
Each unit is equipped with "Surface" advanced developments including automatic controls for all heating cycles. "Surface" furnace design and construction is well known in the steel industry and with many years experience in economical fuel utilization, a low-cost-per-ton operation is assured.

Wherever heat is used—from ingot to the finished product, it pays to consult "Surface" Industrial Furnace Engineers about modern methods and equipment.



Battery of 8 Heat Treating Units, each line consisting of a Walking Beam Hardening Furnace, Automatic Quenching Mechanism, and Walking Beam Draw Furnace. Operation of the heating furnace, quench conveyor, spray equipment, and draw furnaces are synchronized by a timing clock which starts all drives simultaneously at adjusted intervals.

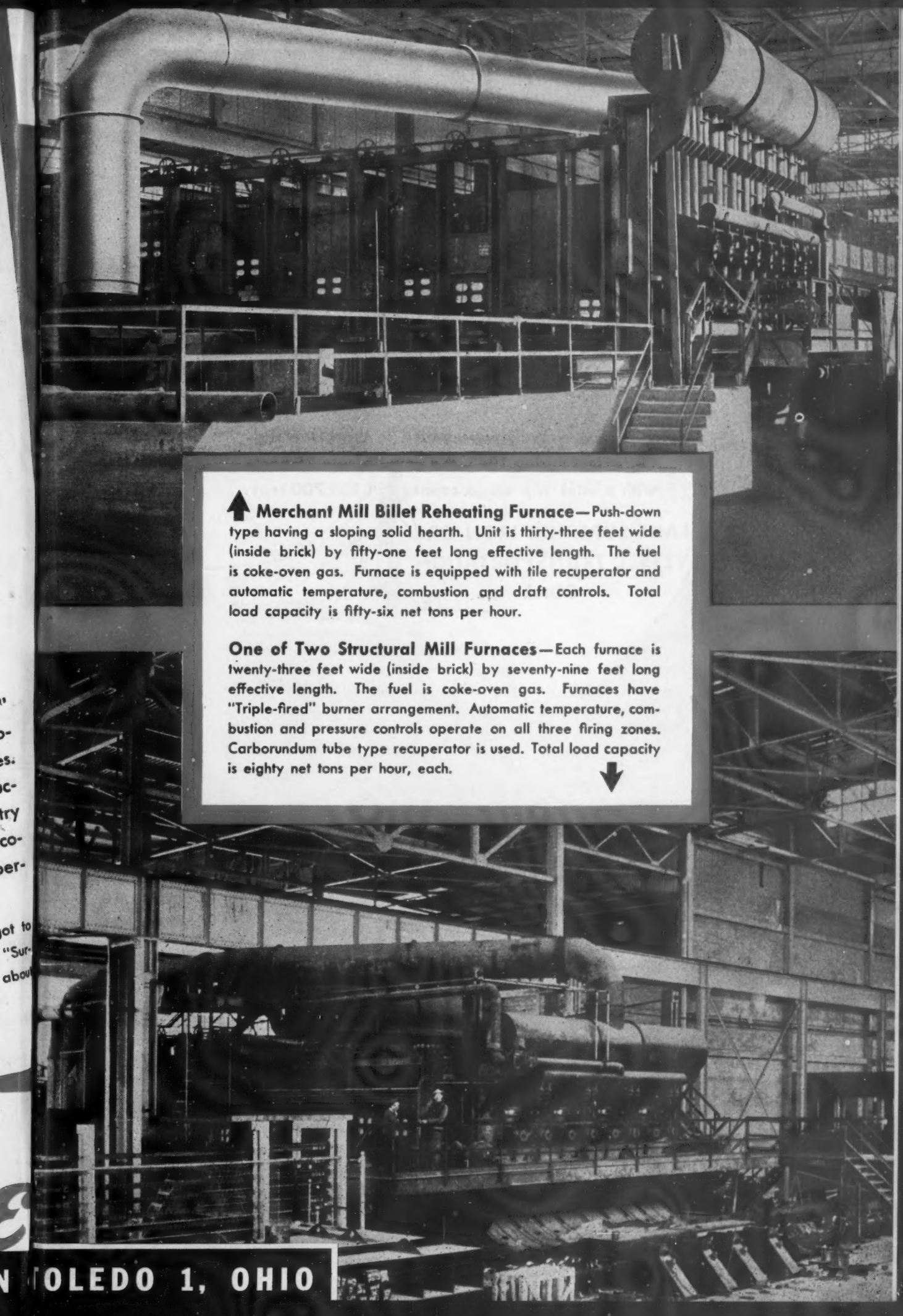




Two 8-inch Shell Heat Treating Units, each line consisting of a Rotary Hearth Hardening Furnace, Quench Tank, and Chain Type Recirculating Air Draw Furnace.

'Surface

SURFACE COMBUSTION



Merchant Mill Billet Reheating Furnace—Push-down type having a sloping solid hearth. Unit is thirty-three feet wide (inside brick) by fifty-one feet long effective length. The fuel is coke-oven gas. Furnace is equipped with tile recuperator and automatic temperature, combustion and draft controls. Total load capacity is fifty-six net tons per hour.

One of Two Structural Mill Furnaces—Each furnace is twenty-three feet wide (inside brick) by seventy-nine feet long effective length. The fuel is coke-oven gas. Furnaces have "Triple-fired" burner arrangement. Automatic temperature, combustion and pressure controls operate on all three firing zones. Carborundum tube type recuperator is used. Total load capacity is eighty net tons per hour, each.

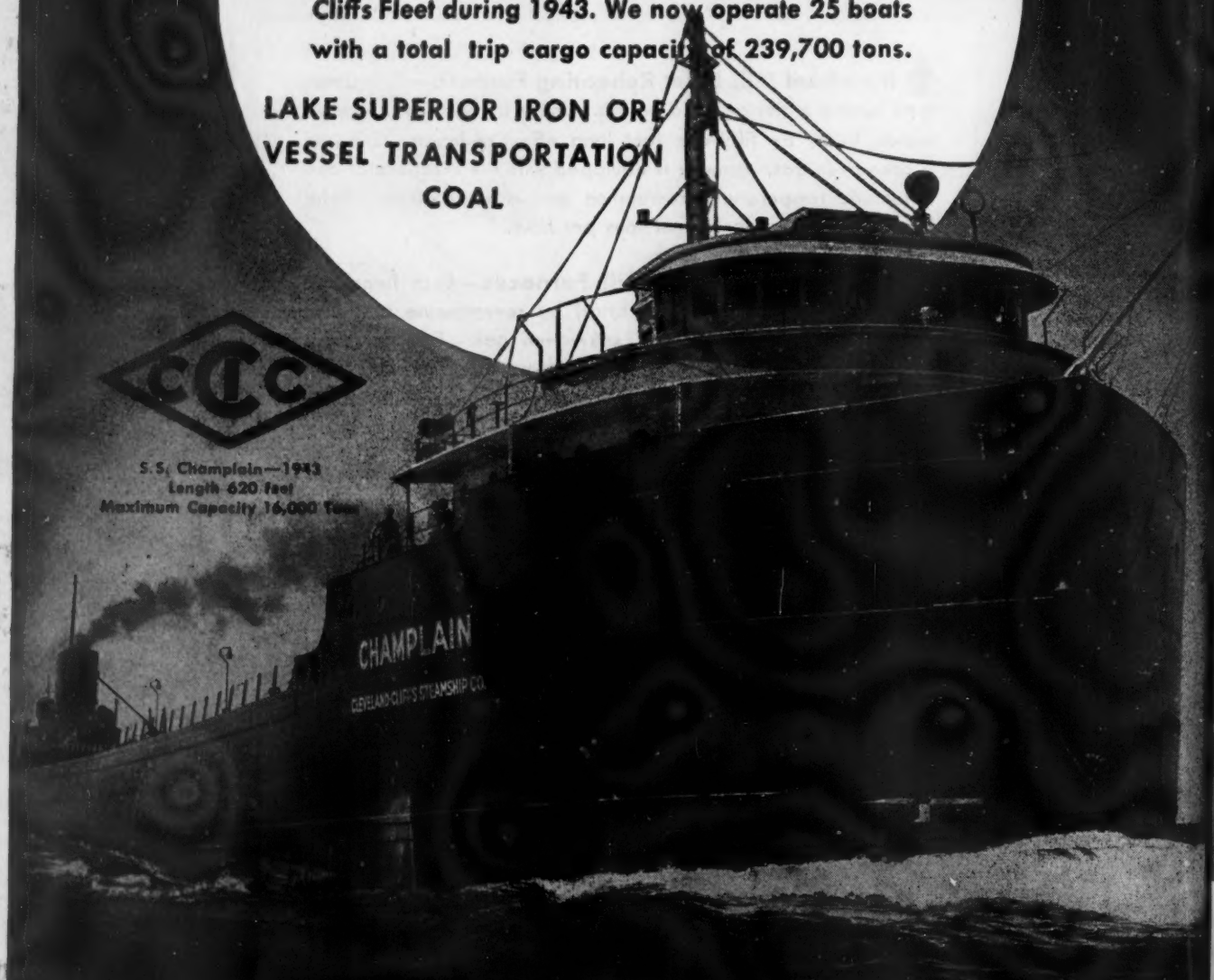
TOLEDO 1, OHIO

Designed TO CARRY

THE COMMERCE OF THE GREAT LAKES *IN WAR AND IN PEACE*

Two great vessels were added to the Cleveland-Cliffs Fleet during 1943. We now operate 25 boats with a total trip cargo capacity of 239,700 tons.

LAKE SUPERIOR IRON ORE
VESSEL TRANSPORTATION
COAL



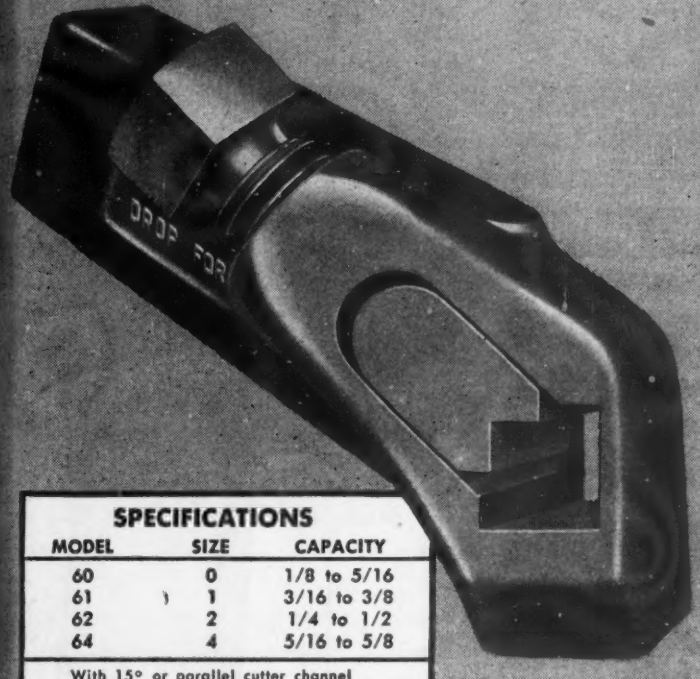
The Cleveland-Cliffs Iron Company

UNION COMMERCE BUILDING • CLEVELAND 14, OHIO

GOT IT!

A TOOL HOLDER *with 10 Times the Grip*

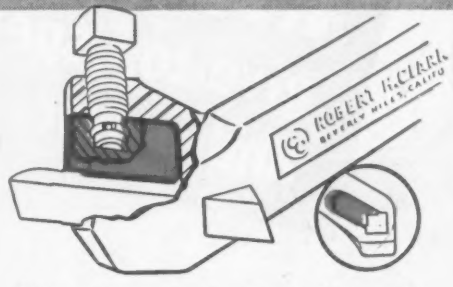
Tests show the new Clark Adjustable Tool Holder has the same rigidity as solid forged tools. Exclusive vise-grip jaw has twice the width and five times the length of the bearing surface found in other tool holders ... runs the *full* length of the cutter channel. Takes four sizes of round or square bits, large or short stub bits, undersize or out-of-round bits ... carbide bits and boring bars, and bits of brittle alloy. Double angle of head gives operator an unobstructed view of the cutting edge for better work control.



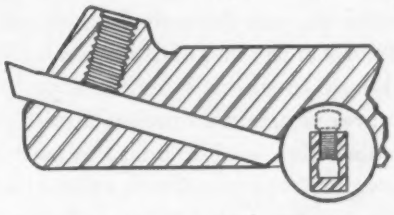
SPECIFICATIONS

MODEL	SIZE	CAPACITY
60	0	1/8 to 5/16
61	1	3/16 to 3/8
62	2	1/4 to 1/2
64	4	5/16 to 5/8

With 15° or parallel cutter channel either left or right hand



Vise-grip jaw in the Clark Adjustable Tool Holder runs the full length of the cutter channel.



Conventional types hold tool bits at only one point, often causing bits to sag, or to be damaged or broken.

For complete information, call your Clark Cutter Jobber today, or write for Catalog S-7-TH

Adjustable Hole Cutter

Grinding Fixture

CLARK CUTTERS

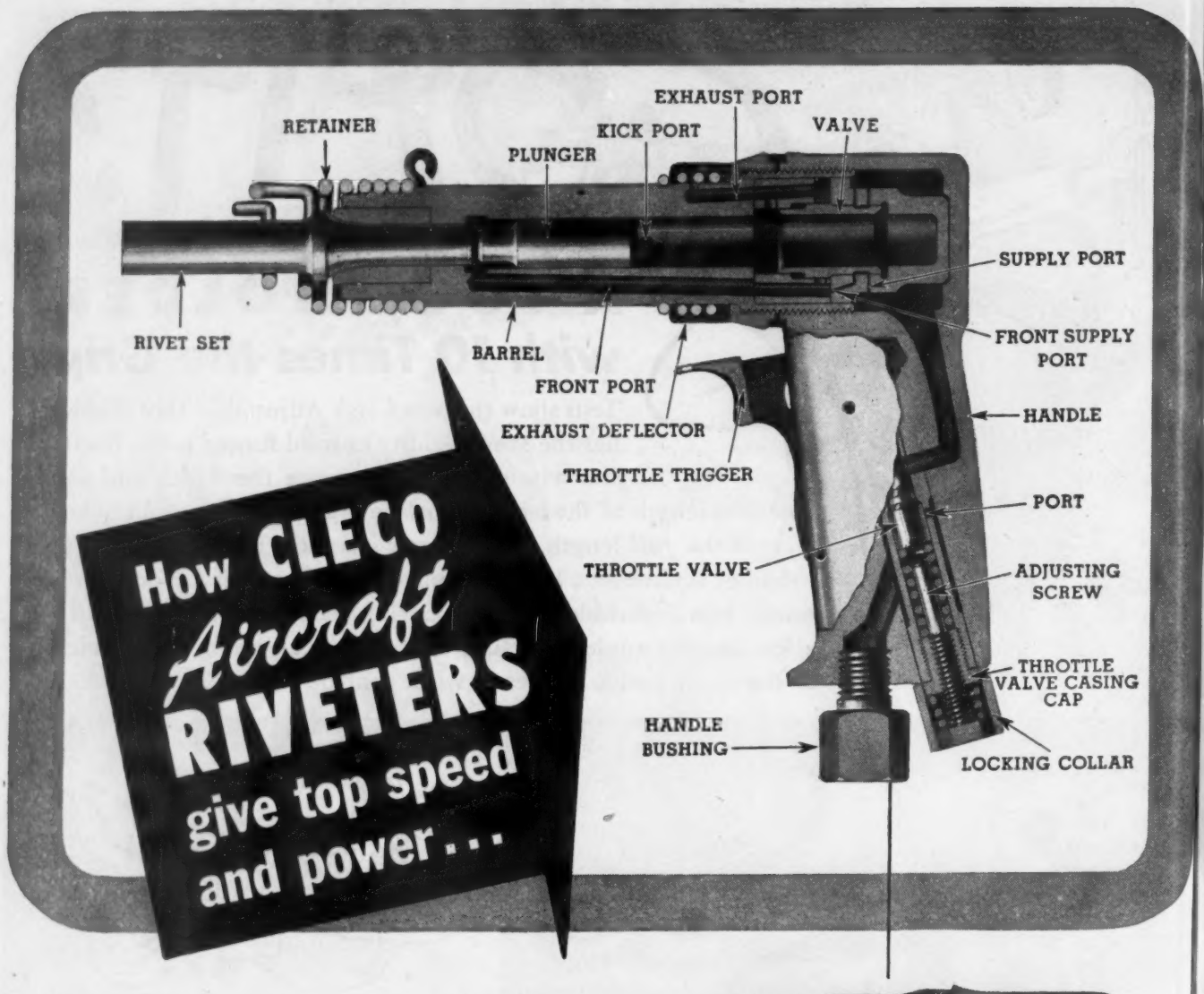
Robert H. Clark Company

9330 SANTA MONICA BOULEVARD • BEVERLY HILLS, CALIFORNIA

Adjustable Counterbore

Adjustable Facing Mill

ADJUSTABLE CUTTING TOOLS FOR ALL MATERIALS

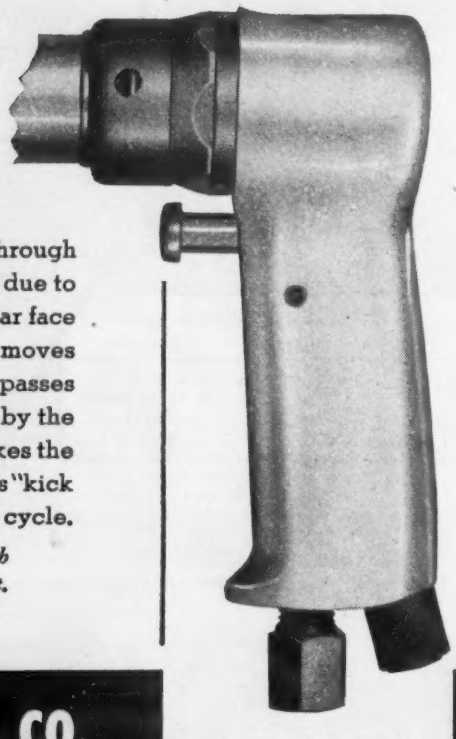


How CLECO *Aircraft* RIVETERS give top speed and power . . .

• Note how precision design features every step in the operation of this Cleco hammer: Air entering the throttle valve, through the supply ports, along the groove of the valve, and through the front supply port forces the plunger to move back from the rivet set. As the plunger returns, it forces air out through the exhaust port until the exhaust channel at the end of the valve is closed by the plunger sliding through the hole in the valve. The valve then shifts toward the rivet set due to air pressure, and air passes through the supply port, across the rear face of the valve, and against the rear of the plunger. As the plunger moves down on its power stroke, exhaust air from in front of the plunger passes from the front port to the exhaust port across the space vacated by the shoulder of the valve when it shifted. Just before the plunger strikes the rivet set, its rear face passes a "kick port." Air pressure entering this "kick port" shifts the valve to the position shown, thus completing the cycle.

Cleco Aircraft Riveters, available in both "slow" and "fast" hitters, with many styles of handles, are fully described in Bulletin 85. Write for it.

SPEED FINAL VICTORY! . . . BUY MORE WAR BONDS



Optional Handle

THE CLEVELAND PNEUMATIC TOOL CO.

3781 EAST 77TH STREET • CLEVELAND 5, OHIO

Branch Offices In All Principal Cities

7 COMPLETE CATALOGUES IN 1

HARRISBURG SEAMLESS STEEL LIQUEFIERS
HARRISBURG SEAMLESS STEEL CYLINDERS
HARRISBURG SEAMLESS STEEL PIPE COUPLINGS
HARRISBURG ALLOY & CARBON STEELS
HARRISBURG STEEL CORPORATION
HARRISBURG PIPE COILS & BENDS
HARRISBURG SEAMLESS STEEL PUMP LINERS
HARRISBURG DROP-FORGED STEEL FLANGES

THE HARRISBURG STEEL CORPORATION
SEAMLESS AND DROP-FORGED STEEL

REFERENCE BOOK

THE HARRISBURG REFERENCE BOOK is designed to give you complete information on all Harrisburg Products, conveniently arranged for quick reference ... over 100 pages of useful information ... specially bound so that it opens flat for easy reading. Contains informative data for everyone in your organization ... send us a list of your personnel and we will mail copies to them free of charge.

ARMY (E) NAVY

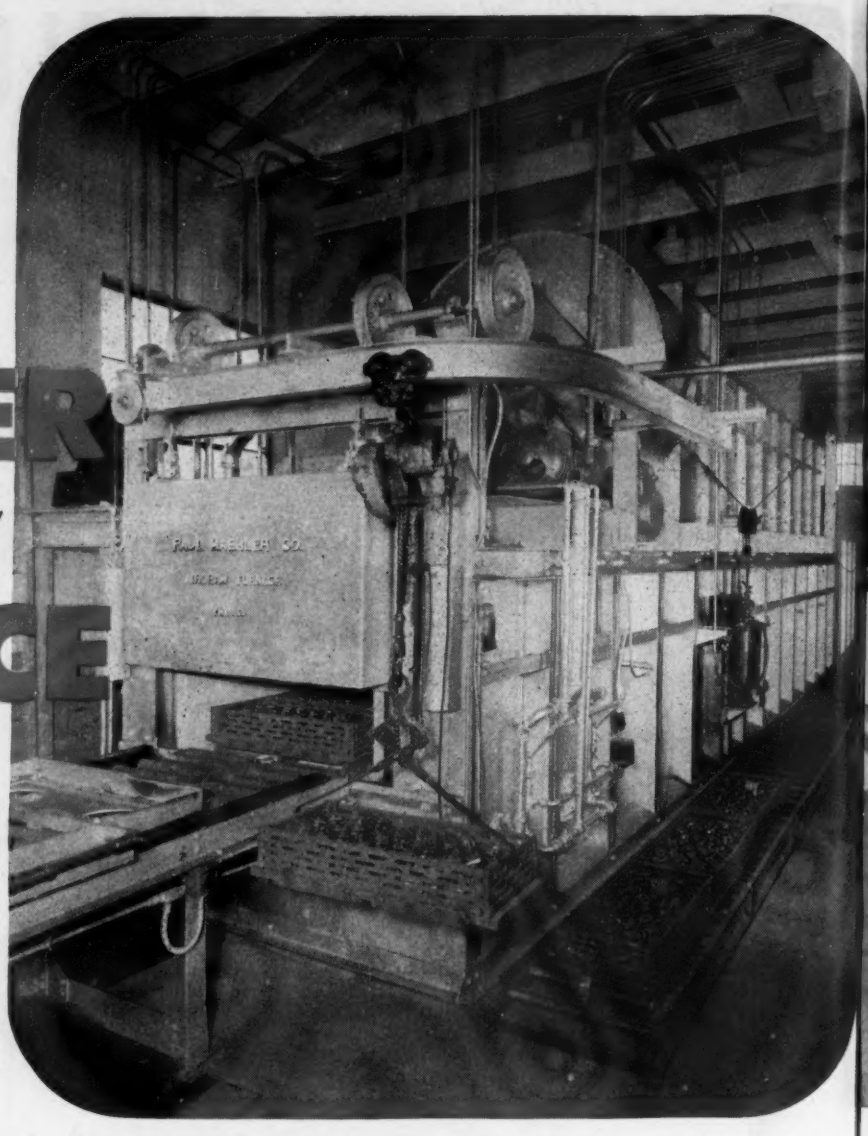
Manufacturers of High Quality Steel Products Since 1863

HARRISBURG STEEL CORPORATION

HARRISBURG, PENNSYLVANIA

annealing 2,000 lbs. of castings per hour with a

MAEHLER *air-draw* FURNACE



The Maehler air-draw furnace at Chambers, Bering, Quinlan Co. used for annealing gray iron castings. This view shows the loading end of the furnace and the return roller conveyor. Furnace accommodates 38 trays 17" x 36" x 6". As one tray enters, one is pushed out at unloading end of furnace.

This Maehler *built-for-the-job* heat treating furnace maintains temperature uniformity within 2° F.!

ANNEALING gray iron castings contribute much to the life of drills, broaches, lathe tools, etc., as well as reducing retooling costs. When the Chambers, Bering, Quinlan foundry decided to anneal its gray iron castings, Maehler engineers were called in. The photo at the right shows the Maehler roller conveyor-type furnace which was installed. Here are the data and specifications of this efficient unit:

- Capacity of furnace 2,000 lbs. of castings per hour.
- Designed to operate at from 800° F. to 1550° F.—gas fired.
- Working space of furnace—4 ft. wide by 3 ft. 2 in. high by 36 ft. 6 in. long.
- Over-all length—including 7 ft. 6 in. pusher loading station and a 12-ft. cooling chamber 57 ft. 6 in.
- Electric robot control panel completely supervises furnace operation.
- Garden City high-temperature fan driven by a 2-speed motor circulates air at high velocity above normal furnace pressure.
- Soaking time of gray iron castings — 1.45 hours at 1200° F

MAEHLER ANNEALING CASTINGS MEAN

- ***INCREASED MACHINABILITY OF CASTINGS***
- ***LOWER RETOOLING COSTS***
- ***FEWER MANHOURS DURING MACHINING OPERATIONS***
- ***ADDED LIFE FOR DRILLS, BROACHES, LATHE TOOLS, ETC.***

Maehler engineers are ready to work with you on all your industrial oven and furnace requirements
Write today

THE PAUL MAEHLER COMPANY
2208 WEST LAKE STREET
CHICAGO 22, ILLINOIS

MAEHLER

Industrial Ovens and Furnaces for Core Baking, Mold Drying, Heat Treating, Enameling, etc.

WHY MONSIEUR DESCHAMPS NEVER OWNED A CAR

IT isn't that he never wanted one. A Frenchman of the upper middle class appreciates the good things of life. But the bitter truth is that French industry never produced a car that Monsieur Deschamps (or 85% of French families) could afford. Yet, the motor car was invented in his country.

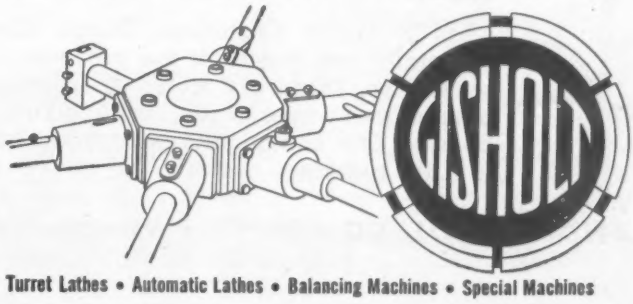
Yes, the first automobile rolled in Paris. But the first assembly lines rolled in Detroit! And they reached a peacetime tempo where "a car for every family" came nearer fact than fancy—where America's automotive industry was producing more cars in six months than existed in all of France.

Swift-moving assembly lines are only the symbol of mass production. Look behind them and see how they're fed. You'll find, for example, *mass machining*—the producing of as many as 3,600 machined parts in a single automobile. Multiply that by nearly 5,000,000 cars a year and you see the need for speed and accuracy to get costs down where the average family can own one.

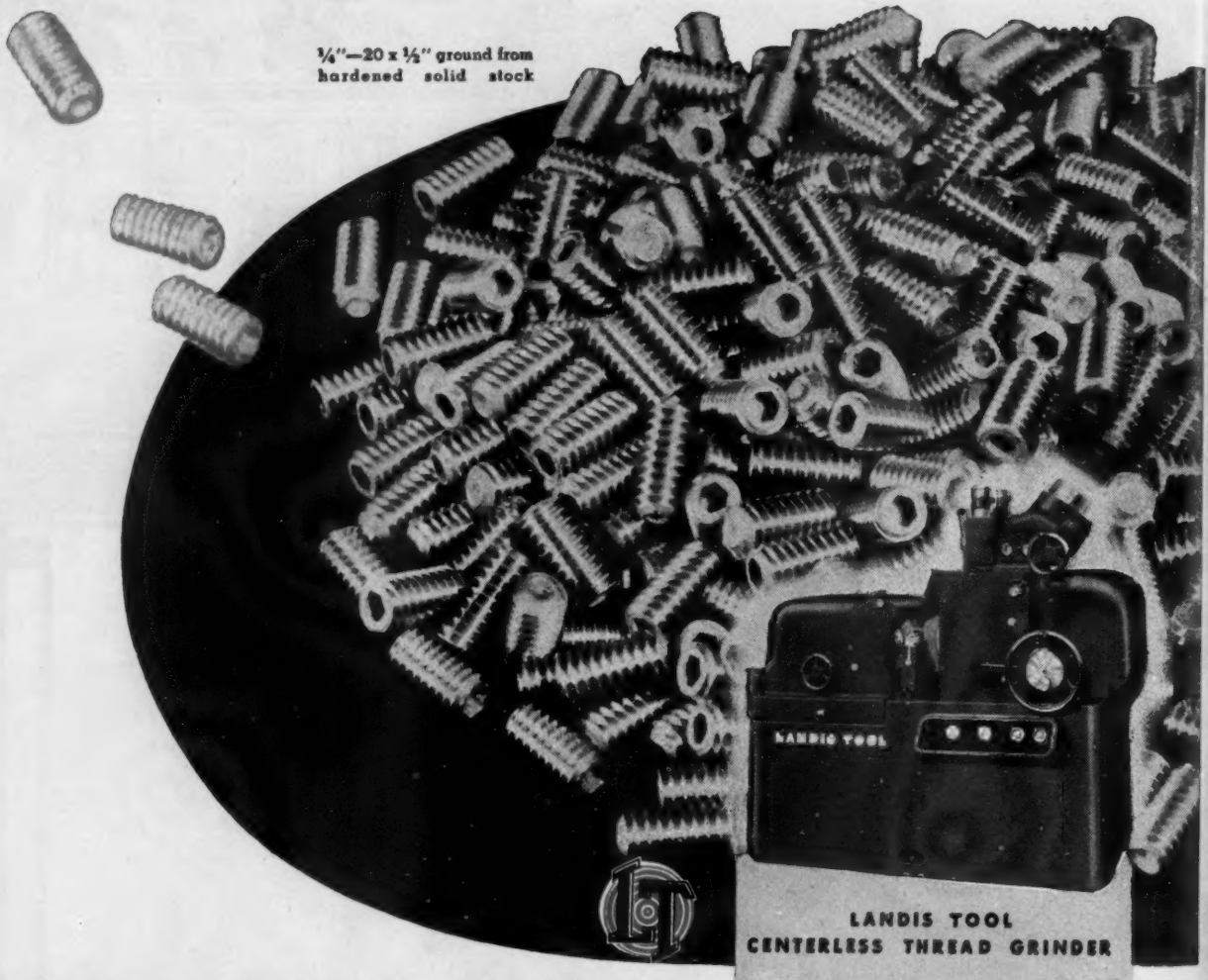
In those long rows of machine tools you'll find many with the name "Gisholt." And you'll find Gisholt engineers, too, working hand in glove with manufacturers in the never-ending search for ways to do the job still better, at still lower cost. It's a constant challenge to do our part for an industry that creates employment for nearly 7 million people and contributes so much to the enjoyment of life in America.

GISHOLT MACHINE COMPANY

1217 East Washington Ave. • Madison 3, Wis.



Turret Lathes • Automatic Lathes • Balancing Machines • Special Machines



LANDIS TOOL
CENTERLESS THREAD GRINDER

11,900 More Screws Per Day

From Solid Hardened Stock

BY NEW CENTERLESS THREAD GRINDING

The new centerless method of grinding threads, made possible for the first time by the LANDIS TOOL Centerless Thread Grinder, has proved itself by a year's trial in actual production of socket set screws.

Comparison of production on the LANDIS TOOL Centerless Thread Grinder over previous methods for identical socket head screws ¼"—20 x ½" showed an increase of 5.67 times in production. On a cost comparison, unit costs were reduced approximately 80%. Reasons for this big advantage in production include—faster production due to thru feed; longer production runs with less time out for tool maintenance; greatly reduced inspection needs because of slow wheel wear; rejects caused by heat treating distortion are eliminated.

LANDIS TOOL Centerless Thread Grinders are especially well suited for the production of socket set screws. There are many other ground thread applications where centerless thread grinding may be used. Our engineering department will be glad to make recommendations.

LANDIS TOOL COMPANY • Waynesboro, Pa.

ADVANTAGES
Over
Other Methods

- Production increases up to 500%
- Cost reduction as much as 80%
- Fewer rejects
- Less inspection
- No burrs
- Bright finish
- Perfect thread form
- Perfect lead control
- Better starting thread

LANDIS TOOL
Precision Grinders

24AS

Galvanized Metal Buildings for Troops in Iceland

★ In every part of the world today, galvanizing, or zinc coating, protects our fighting men and equipment . . . for the U. S. Bureau of Standards has pronounced zinc "by far the best" metallic coating for the protection of iron and steel against rust. Tomorrow zinc will play an equally important part in the protection of America's peace-time products.

EVERY GRADE OF ZINC FOR WARTIME REQUIREMENTS

PRIME WESTERN

SELECT

BRASS SPECIAL

INTERMEDIATE

HIGH GRADE

SPECIAL HIGH GRADE

AMERICAN ZINC SALES COMPANY

Distributors for

AMERICAN ZINC, LEAD & SMELTING CO.

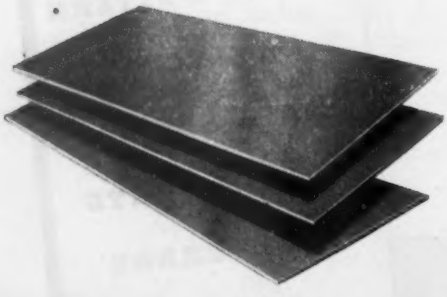
COLUMBUS, OHIO CHICAGO ST. LOUIS NEW YORK

Sights like this were common, when we started making...

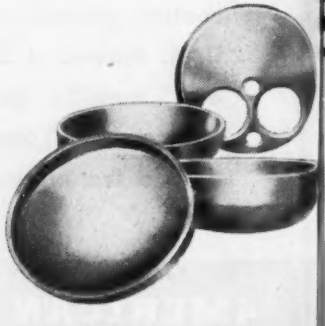
Sheared STEEL PLATES

—and too, gas lights were still used in homes—and telephones were really few and far between—and admittedly our facilities and equipment weren't then what they are now—but even so we made good steel plate (and we're still making it). Yes, we're rather old in years and experience, but not in facilities, methods and equipment.

Worth makes Steel Plate up to 150" wide—also Flanged and Dished Heads from 9½" to 216" O.D., in thicknesses from $\frac{3}{16}$" to 4".



WORTH



ARMY E NAVY

SHEARED STEEL PLATE

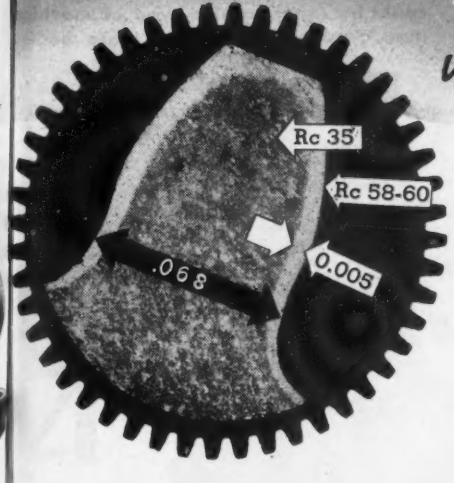
FLANGED AND DISHED HEADS

WORTH STEEL COMPANY · Claymont, Delaware

They're All Talking About It!

A New Thin Case Contour Hardening Job . . .

with MEGATHERM*



Thin case contour hardening of gear teeth with controlled depth of hardness has been made possible by the use of MEGATHERM induction heat.

The hardened surface completely follows the tooth and root contour of the gear with the core still in its original state, as shown plainly by this microphotograph. This 0.005 case was applied to gears of 24 D. P. —51 teeth—2.125 P. D.—2.208 O. D. and S.A.E. 4140 steel in 1/4 of 1 second with a 25 KW MEGATHERM—5 megacycle energy doing the job.

These long wearing contour hardened gears become an automatic production item with MEGATHERM.

Write *today* on your company letterhead for data on MEGATHERM.

Federal Telephone and Radio Corporation

*REG. U. S. PAT. OFF.

AN IT&T ASSOCIATE

Newark 1, N. J.

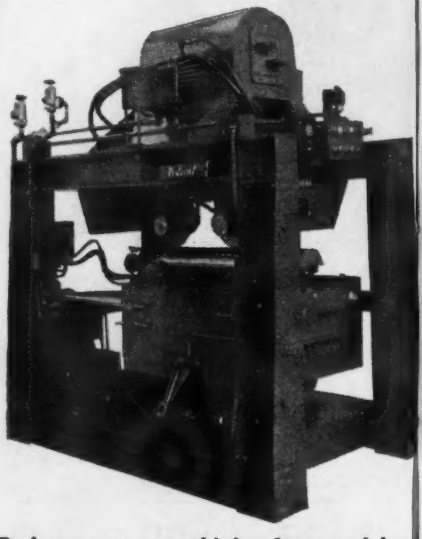
SPECIAL SHAPES?...Yes They Can Be RESISTANCE WELDED On *Federals*...

WHILE the information in these pages is particularly interesting to designers and producers of metal containers, it is also significant to fabricators of metal goods of all kinds, because: . . . Despite a general lack of understanding, **resistance welding IS adaptable to high-production automatic fabrication of special shapes.** Consider the five Federal Resistance Welders illustrated herewith. They are welding blitz cans, ammunition boxes, parachute flares . . . but the same type of machines could be producing . .

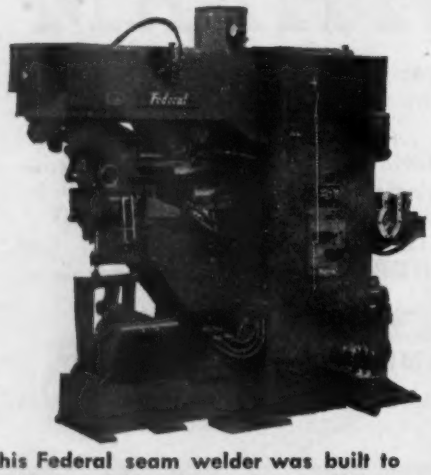
A variety of Containers for the goods of normal living . . . automotive accessories . . . house heater casings . . . refrigerator liners . . . evaporators . . . condensers . . . transformer cases . . . machine or instrument housings . . . fan housings . . . tool boxes . . . tote boxes . . . tanks . . . tubs . . . pails . . . oil cans . . . washing machines . . . hundreds more of products wherever the quantity is great enough to warrant investment in special machinery, and of course still more hundreds of less special shapes for which there are standard Federal Resistance Welders in great variety.

The point is . . . **resistance welding is not limited to the narrow field of usefulness encompassed by general knowledge.** It is a **better** form of welding, and a **versatile production tool.** It is worth while for anyone concerned with metal fabrication at low cost to get all of the facts about resistance welding.

Federal is willing, and able, to give you such information if you will **tell us what you want to know about resistance welding.**

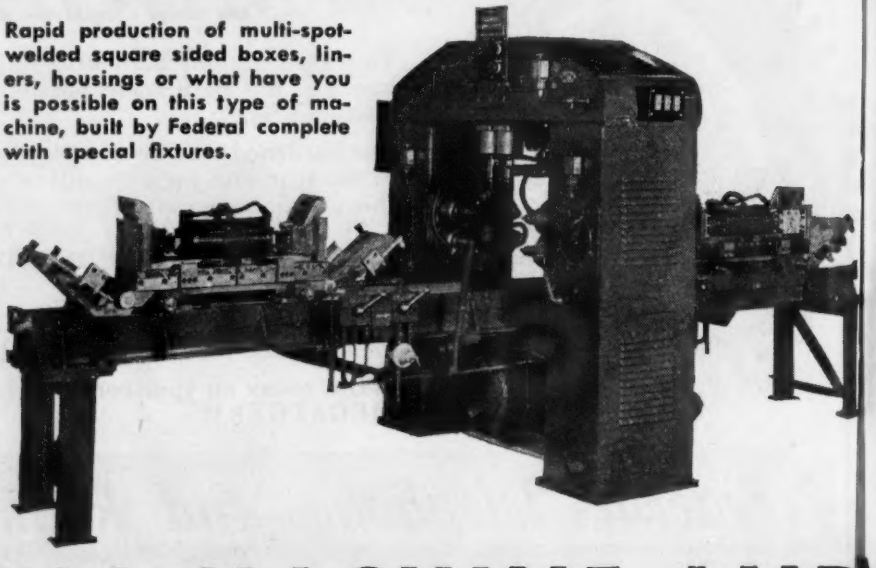


Perhaps you can think of several long cylindrical containers or casings which could be made by this type of machine here producing parachute flare bodies



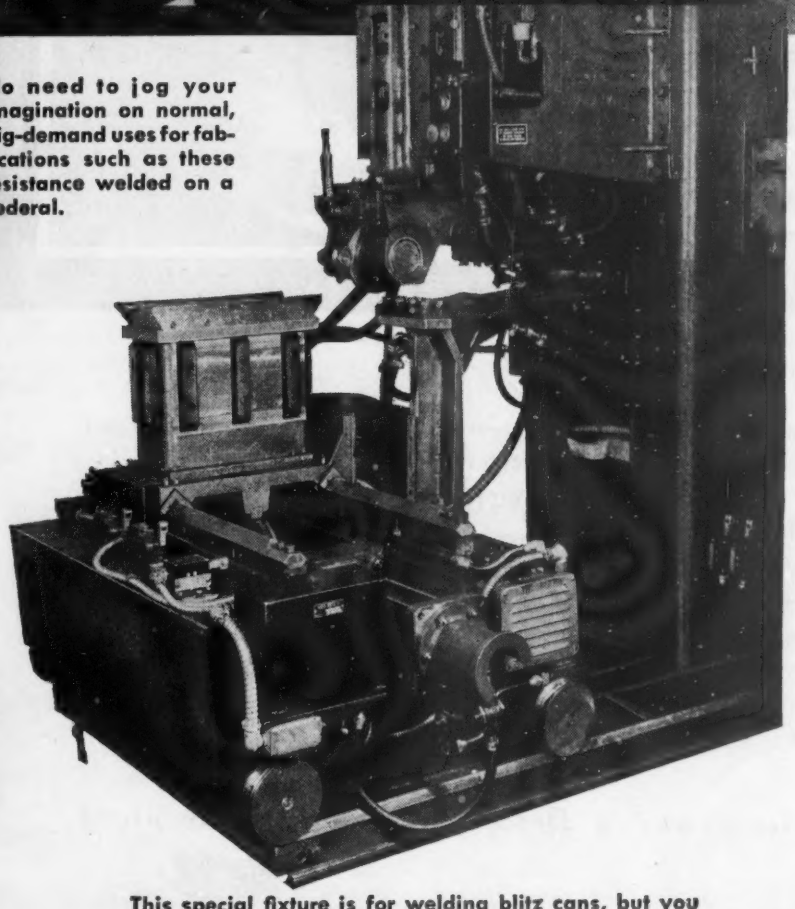
This Federal seam welder was built to weld ammunition boxes, but could produce every-day goods containers with simple die changes.

Rapid production of multi-spot-welded square sided boxes, liners, housings or what have you is possible on this type of machine, built by Federal complete with special fixtures.



THE FEDERAL MACHINE AND W

No need to jog your imagination on normal, big-demand uses for fabrications such as these resistance welded on a Federal.



This special fixture is for welding blitz cans, but you can quickly sketch many other shapes that could go into production on this machine.

WELDER CO. 202 Dana Street WARREN, OHIO

VERSATILE MODERN PRODUCTION TOOLS

400 WELDED PAILS PER HOUR

An ingenious application of automatic resistance seam welding to the fabrication of five-gallon pail bodies has been developed by The Federal Machine and Welder Company, is currently producing 400 bodies per hour for a large manufacturer of containers. Operator merely inserts formed body in special indexing fixture, presses foot pedal. Balance of operation is automatic, including ejection of finished body. Still greater production is in sight with design improvements newly added to this machine, which is adaptable to fabrication of any cylindrical container, not restricted to five gallon capacity.

WELDING RADIO TUBES

Producing metal radio tubes in vast quantities with a low percentage of "leakers" is a problem. It is being very successfully done by projection welding on an ingenious press type welder developed by The Federal Machine and Welder Company. The machine produces a triple weld . . . welding the socket to the filament assembly and these to the casing. It is all done in one operation, automatically indexed and producing 2500 tubes per hour.

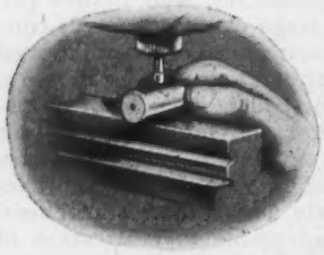
HOW BARRELS ARE MADE

Latest informative book to come from the press under the sponsorship of The Federal Machine and Welder Company is one describing in detail a complete steel barrel production plant designed and built by Federal. Built for army supply base use, the plant employs equipment adaptable to peacetime container fabrication, has a capacity of 70,000 barrels (55 gallons) per month. A limited quantity of these books are available to designers and fabricators of containers sufficiently interested to write, giving company name and individual title.

MORE ABOUT SPOT WELDERS

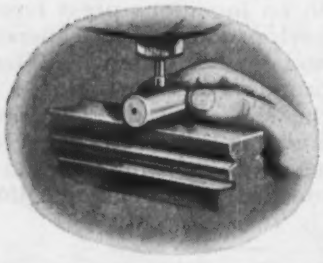
Condensed information on spot welders that is particularly useful to anyone not familiar with their application is featured in new bulletins now available for free distribution by The Federal Machine and Welder Company. "Type R" bulletin describes rocker arm machines for general utility welding. "Type P" bulletins are on the subject of press type welders for a wide range of spot, projection, "Percussion" and mash welding.

"The Job's Easy-
I KNOW WHERE I AM!"



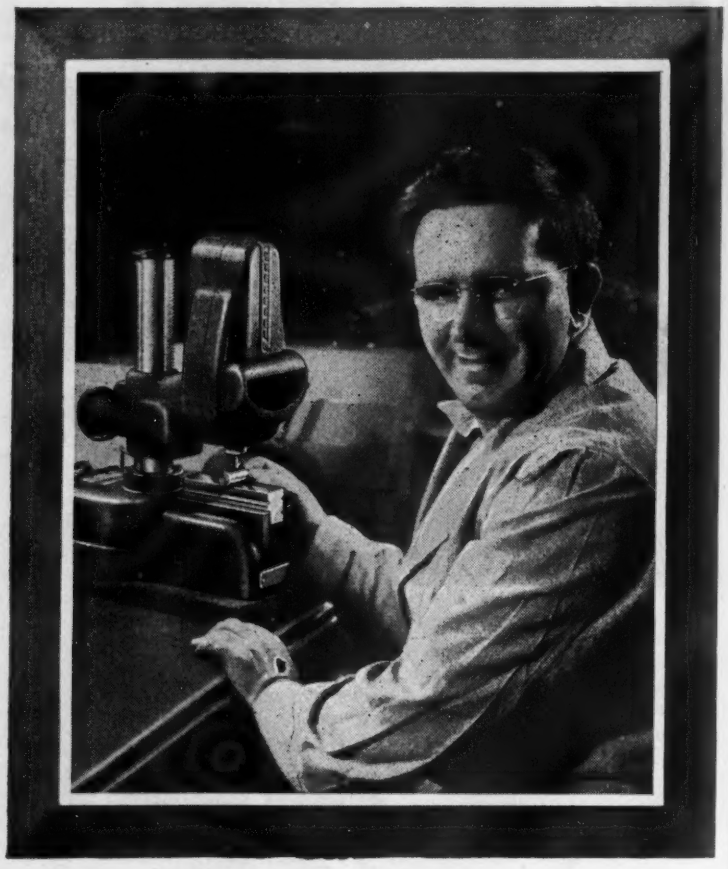
"LAST WEEK

I was grinding to a tolerance of .002". It was a cinch with a gage like this!"



"THIS WEEK

I'm grinding to .0005", four times as close—sounds tough, but it isn't ... THE SPREAD IS THE SAME!"



SURE, the job *is* tough if you don't know "where you are". But, higher amplifying indicating gages used right at the machine make tough jobs easier. They tell you where you are and what you're doing.

RESULTS—a better operator producing quality work—and more of it—at lower cost and with far less scrap and rework time. Every piece is checked, starting with the first. Assembly costs are reduced. The gage tells whether the machine is going out of adjustment—whether the tools are getting dull and if the operator is doing anything wrong.

"CHEK WITH SHEFFIELD"—Visual gages in six different amplifications, Precisionaires of four different amplifications with Airsnap or Air Spindles, Electrigages, Dial Indicator Gages, Thread Checking Instruments and many others, make possible the selection of the right instrument for use at the machine for process control of both internal and external dimensions.

Write for Engineering Data and a Demonstration in your plant

THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

SHEFFIELD MASTER CRAFTSMEN

MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES

"Of course Otis makes small freight elevators, too."

For a great many years, small freight elevators made up the greatest part of Otis business. Today, they still constitute a large percentage of Otis sales.

Small or large, for two stories or twenty, with Otis freight elevators you are assured of dependable and economical performance.

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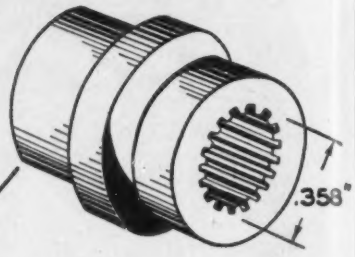
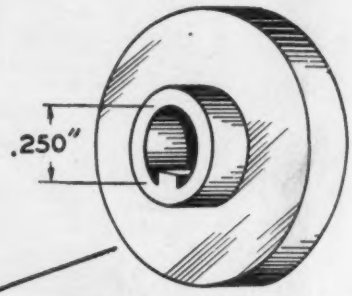
Otis ELEVATOR COMPANY
OFFICES IN ALL PRINCIPAL CITIES

They're Everyday Jobs for the "Junior"

PULL BROACHING
(With Pull-Down Attachment)

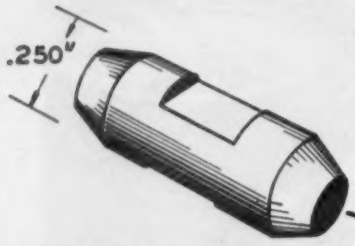


Broaching small splines in lever hubs.

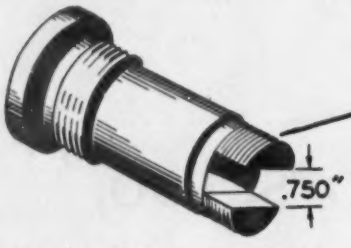


Broaching inverted .062 key in ¼" hole, ½" long.

PUSH BROACHING

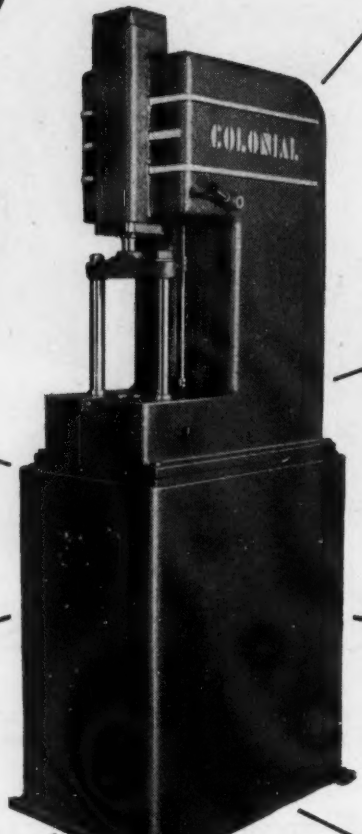


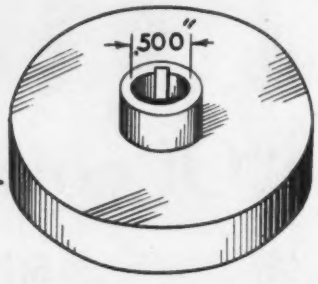
Straddle Broaching ¼" wide flats on ¼" diam. pivot pins.



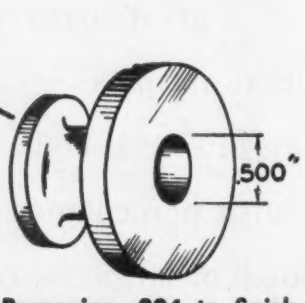
Burring slots in fuse bodies after turning and threading.

Finishing ID to .002 in 1-½" long seamless brass tubing.





Cutting .155 by .070 keyway ¼" long in ½" hole.



Removing .004 to finish a ½" hole, ¾" long.

In practically every shop there are "little" jobs—assembly, broaching, etc.,—which the Colonial "Junior" Press—with or without pull-down attachment, base type or bench type—can do quicker and better. Full hydraulic—available with variable speed and pressure controls. Capacities 1 to 4 tons; 12 inch stroke.

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Easy to FORM
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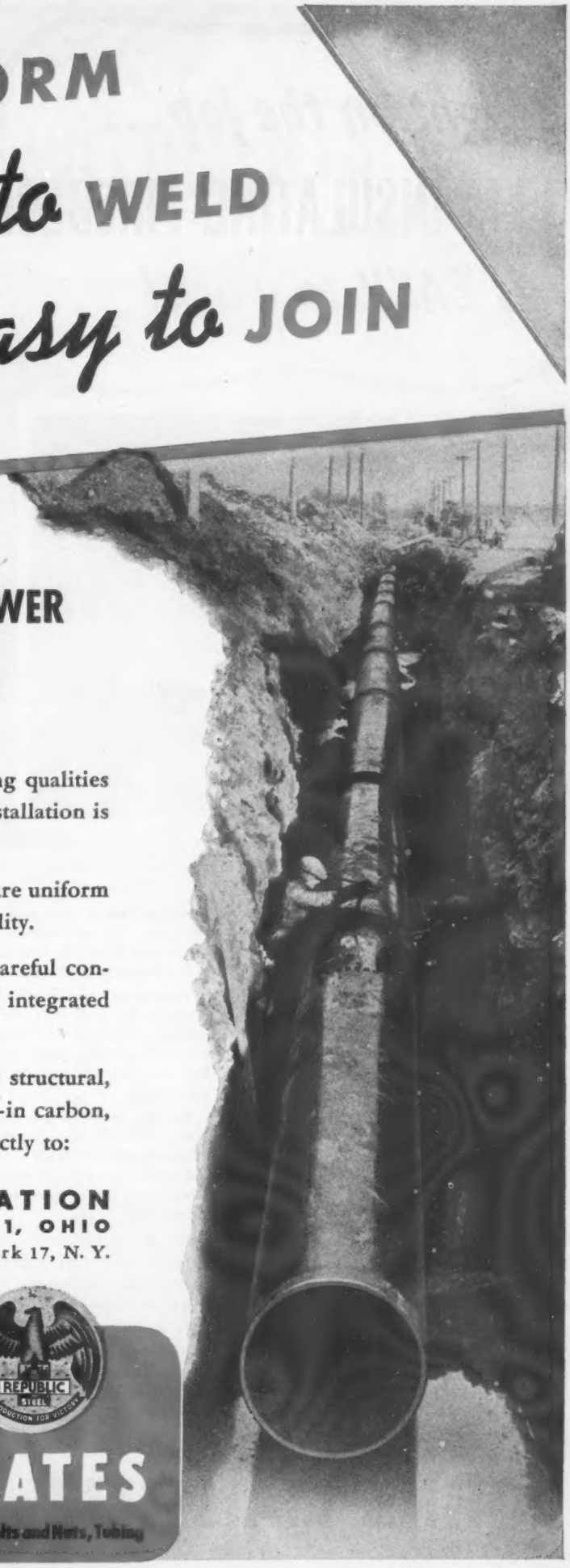

UNIFORMITY IS THE ANSWER IN REPUBLIC PLATES

• In large diameter pipe lines, uniform fabricating qualities of steel plates are a "must" requirement, if the installation is to be made profitably.

Republic Plates fabricate uniformly because they are uniform in size, uniform in thickness and uniform in ductility.

Moreover, uniformly high quality is assured by careful control of every production operation in *one* well integrated organization.

For further information on Republic Plates—for structural, tank, boiler, marine, truck or other applications—in carbon, alloy, high strength or stainless steel—write directly to:

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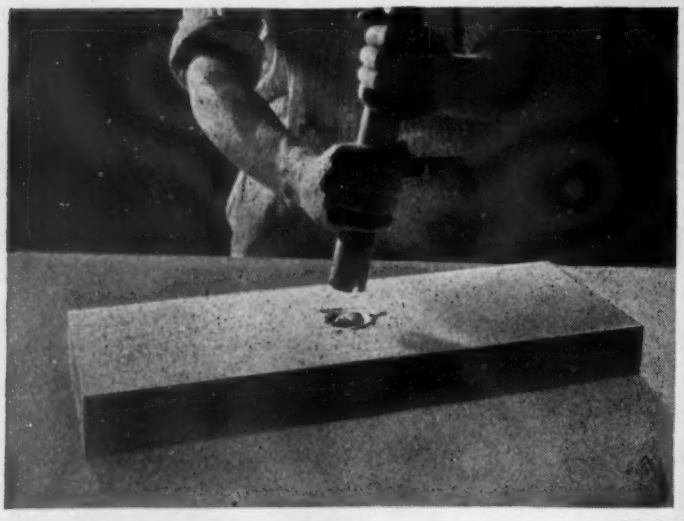
Other Republic Products include Pipe, Sheets, Strip, Bars, Wire, Bolts and Nuts, Tubing

Right on the job...

J-M INSULATING FIREBLOK

is EASY to work!



YOU can saw, rasp or drill Johns-Manville Insulating Fireblok in little time, with simple tools. Shape and fit it into irregular spaces. Eliminate large inventories of special sizes . . . *and speed installation.*

Johns-Manville Insulating Fireblok offers *all* these advantages:

Exceptionally light weight: Each J-M Insulating Fireblok, though over five times as large, weighs little more than one ordinary fire brick!

Speedier assembly: This lightness . . . coupled with extra size . . . enables Fireblok to be installed more quickly thus cutting expensive furnace downtime and lowering labor cost.

Economical Bonding: Fewer joints make a substantial cut in the amount of cement needed for bonding. (J-M 1626 cement was developed especially for this purpose.)

Fewer joints cut heat loss: The broader, uninterrupted surfaces of large-size Fireblok increase the thermal efficiency of the construction.

Variety of uses: Particularly recommended for industrial furnaces, flues, stacks, etc. Also, for lining doors, suspended arches, and when tapered, for sprung arches of exceptional stability.

Specific temperature ranges: Large-size J-M Fireblok—like small-size J-M Insulating Fire Brick—come in four different types . . . each especially developed for its particular temperature range.

Part of a team: Fireblok is but one of many J-M industrial insulations. Like the others, it represents years of research—experience that can help you in your insulation planning. For further information, write Johns-Manville, 22 E. 40th St., New York 16, N. Y.

Installing J-M Fireblok on a suspended arch-type furnace, using convenient J-M hanger supports. Despite the large size of Fireblok, it is light in weight . . . easily handled.

4 Types Available:

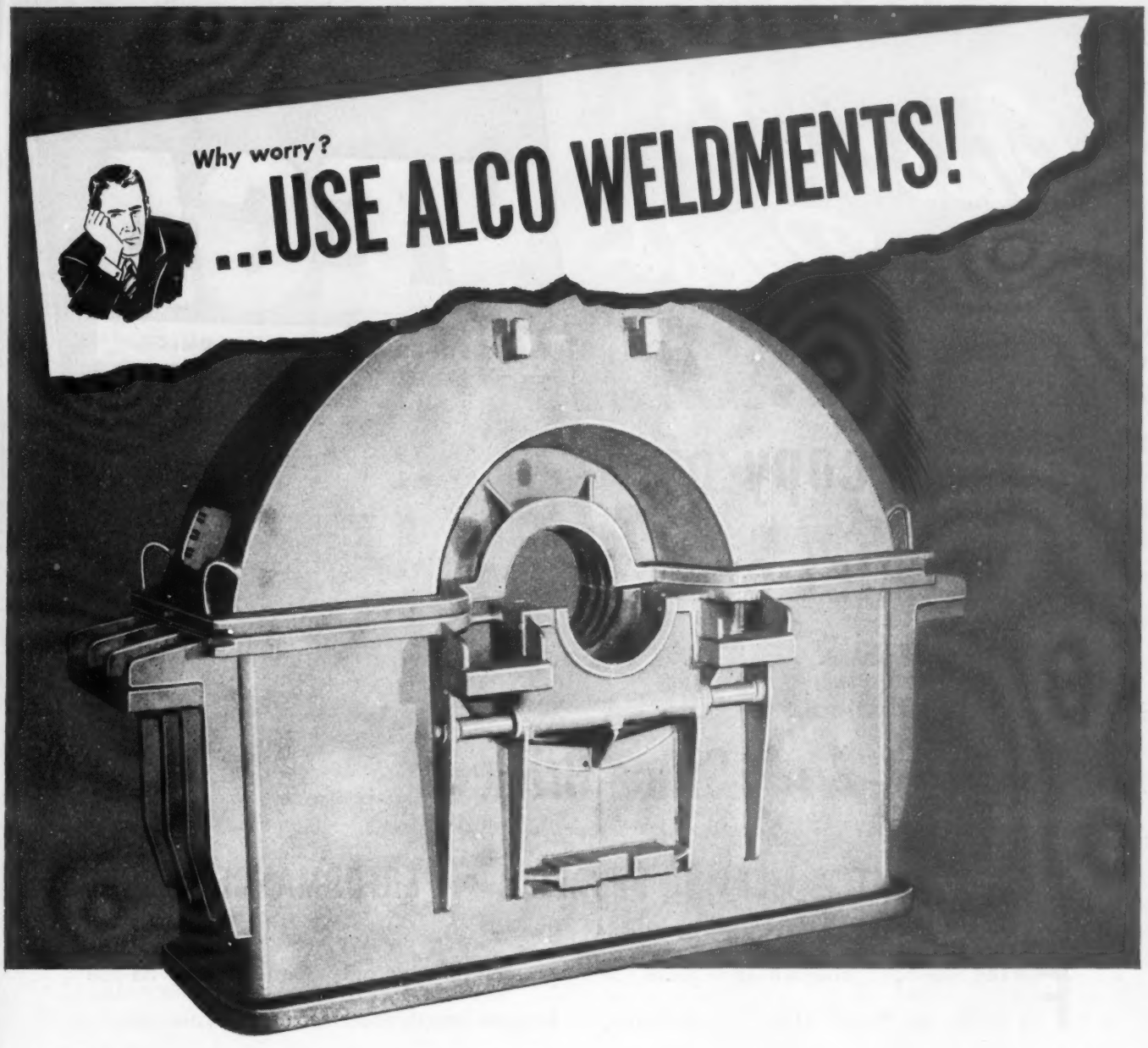
JM-1620 Fireblok for exposed temp. to 1600°F. As back-up to 2000°F.

JM-20 Fireblok for use up to 2000°F. Exposed or back-up.

JM-23 Fireblok for use up to 2300°F. Exposed or back-up.

JM-26 Fireblok for use up to 2600°F. Exposed or back-up.

JOHNS-MANVILLE *First in* INSULATIONS



Here's Why: Weldments are becoming increasingly popular as a superior, more economical method of fabricating metal parts and products.

Of course. For one thing, rejects do not occur with weldments after machining starts. That means weldments *save worry and waste.*

For this reason, and other reasons stated below, weldments often *cost* less than any alternative available for the same service.

Another important angle is that there is a large body of skilled welders. Hence, schedules are less likely to be interrupted because of possible skilled-labor shortage.

ALCO guarantees to furnish engineering talent to design your product or part for production by ALCO weldments, and to produce such weldments as will ensure the following:

1. Complete machining without rejects due to faulty materials.
2. Prompt delivery.
3. Higher-quality product.
4. Less weight.

And remember, no item is too complicated for ALCO weldment design.

American Locomotive

ALCO PRODUCTS DIVISION

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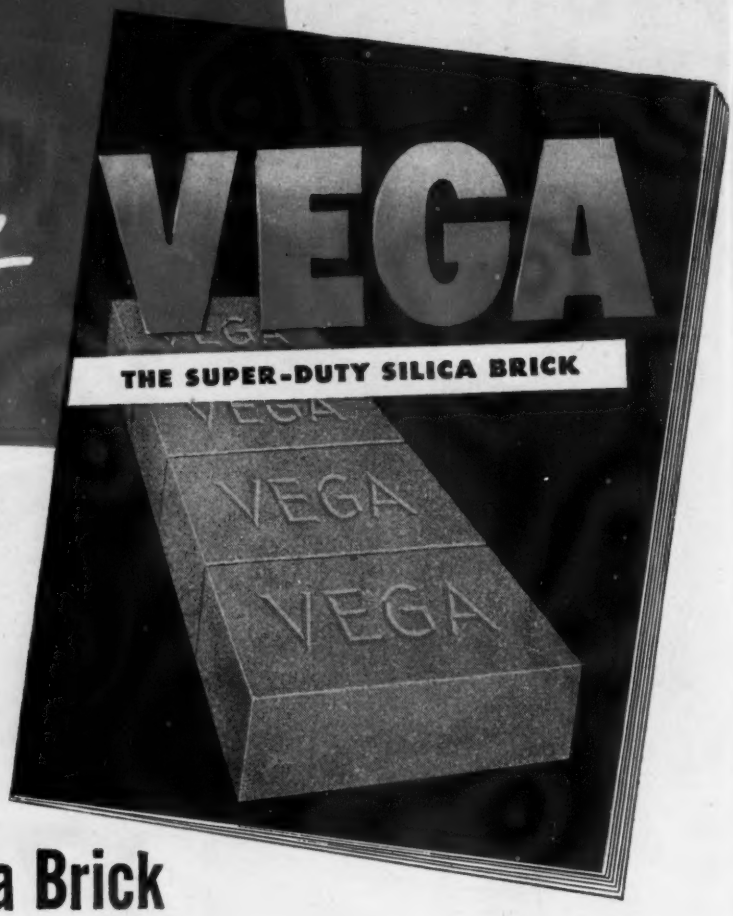
Just off the Press



Get your copy of this Booklet on VEGA the *Super-duty* Silica Brick

• DEVELOPMENT • MELTING BEHAVIOR • PERFORMANCE RECORDS

FOR the benefit of those whose requests for VEGA, the Super-Duty Silica Brick, Harbison-Walker has as yet been unable to meet, there is available a special booklet containing vital data as to this new Super-Duty Silica Refractory.

The booklet gives important information about VEGA — its longer life — the higher permissible operating temperatures and the greater tonnage output afforded by its use in open-hearth and electric steel furnaces.

It is hoped that conditions will soon permit still larger scale production of VEGA. Meanwhile the fact-filled illustrated booklet will tell you of the many advantages of this Super-Duty Silica Refractory.

Write for your copy of the booklet today.

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Here's what Taylor-Winfield's FLEXIBLE PRODUCTION ZONE means to you . . . more jobs on the same resistance welder with less retooling costs

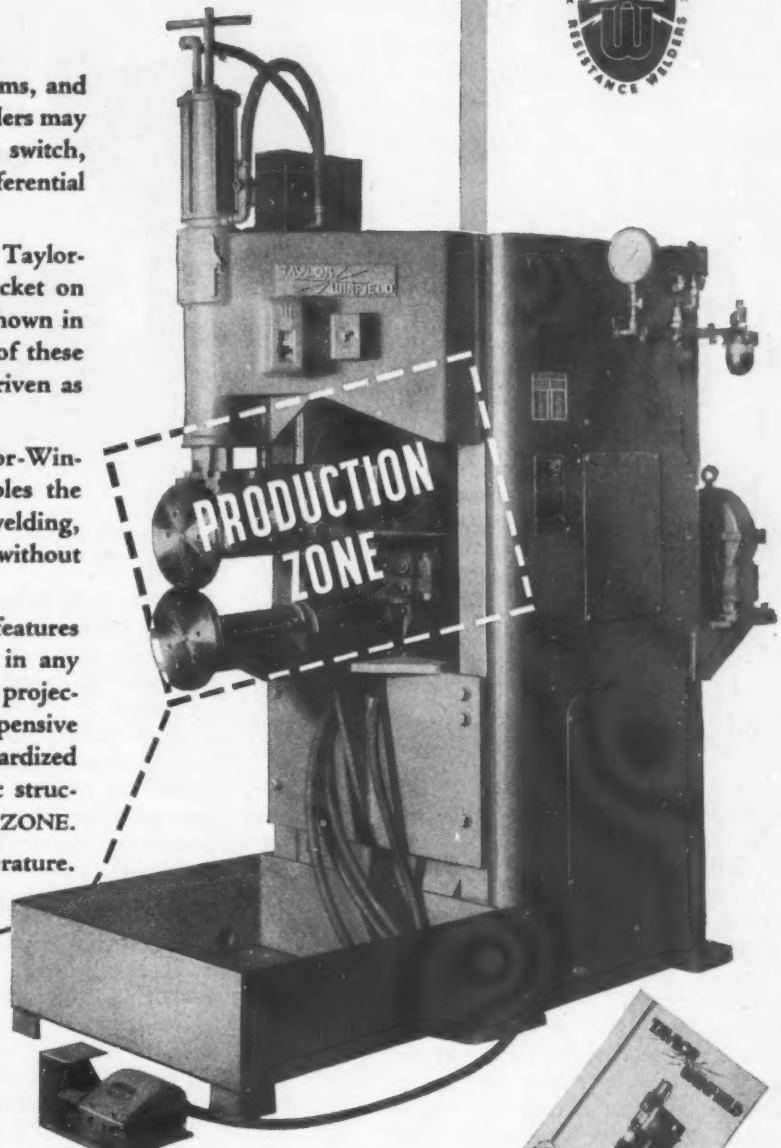
The production zone (electrodes, arms, and fixtures) of Taylor-Winfield Seam Welders may include swinging arms which you can switch, in a jiffy, from longitudinal to circumferential welding or vice versa.

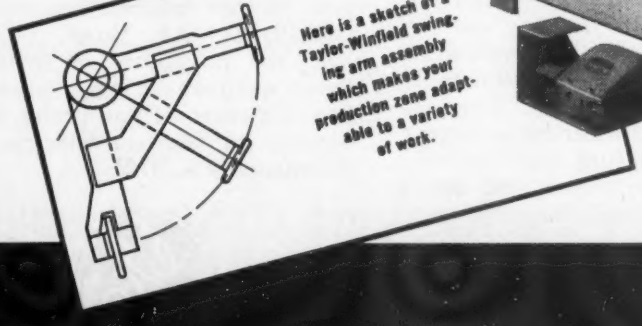
To permit even greater flexibility, Taylor-Winfield can provide an auxiliary bracket on the swinging arm for extra arms (as shown in sketch below). The circular electrodes of these extra arms may idle or they may be driven as required.

The Universal Head is another Taylor-Winfield flexibility feature; this unit enables the operator to change from one type of welding, such as longitudinal, to circumferential without time-consuming changes.

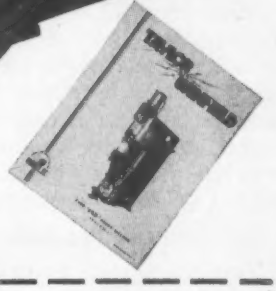
Taylor-Winfield has many patented features to help you get lowest cost per piece in any form of resistance welding (spot, seam, projection, flash-butt). You eliminate much expensive retooling when you buy a highly standardized Taylor-Winfield welder of proven basic structure with the FLEXIBLE PRODUCTION ZONE.

Write today for engineering-styled literature.





Here is a sketch of a Taylor-Winfield swinging arm assembly which makes your production zone adaptable to a variety of work.



The Taylor-Winfield Corporation

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The Taylor-Winfield Corporation
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Send us bulletin on seam welders

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New ELECTRONIC CONTROL FOR SMALL RESISTANCE-WELDING JOBS

This new G-E electronic heat control used with a small bench welder is an important factor in the high production rate attained in the welding of electronic tube parts.

WHAT IT OFFERS YOU

1. **Synchronous Precision Timing**
   - a. Easy, accurate adjustment
   - b. Uniform results
2. **Electronic Heat Control**
   - a. High production
   - b. Little or no distortion of material
   - c. Satisfactory welding of small difficult-to-weld parts

NOW you can be certain that your low-capacity spot welders will be precisely controlled, insuring better welding results. When connected to a suitable transformer, this control, used either on a bench welder or with welding tongs, makes an ideal combination for welding of all sorts of small parts. A good example of this is in the welding of tube parts where tungsten, fernico, copper, tantalum, magnesium, and molybdenum are constantly being welded with good results.

Synchronous Precision Timing

You know that accurate control of weld time is essential to the consistent welding of small parts, because the optimum weld time for high production and little distortion is less than ten cycles. In fact, it is often only one or two cycles.

Synchronous precision timing enables you to adjust the weld time in one-cycle steps from one to ten cycles. Also, with this type of timing you are assured that the preset timing will be exact (no deviations from weld to weld).

Electronic Heat Control

You also know that, in welding small parts, it is vital to have a means of adjusting the current to very close values, as relatively slight changes in welding current will result in either no welds, weak welds, or burned parts. Adjustable electronic heat control provides the necessary preciseness of current control for welding small parts—especially those metals and alloys which are difficult to weld consistently.

Flexibility of Operation

This equipment is suitable for operation on either 230- or 460-volt, 60-cycle power supply. Because the tubes have the same current rating on either voltage, the transformer that is used on a 460-volt supply can be twice as large as that required on a 230-volt source—this will approximately double the secondary or welding current.

How This Control Can Help You

If you're doing small welding jobs, this control can undoubtedly help you speed up production by providing precise welding control, and thereby reducing rejects. Our local office will be glad to send you further information on the CR7503-A140A2 timer, or talk over the possibility of installing these controls on your assembly line. However, if you prefer, write directly to General Electric Co., Schenectady 5, N. Y.

GENERAL ELECTRIC

645-36-8960

RESISTANCE-WELDING CONTROL

Buy all the BONDS you can—
and keep all you buy

In the Hack Saw Blades You Make

OFFER MORE of ALL 4

- Tough Cutting Edges
- High Impact Resistance
- Relative Freedom from Decarburization
- Lower Cost

YOU CAN with

INGERSOLL D-B-L* HACK SAW STEEL

Hack Saw Blade Makers were quick to recognize in Ingersoll D-B-L a superior steel for hack saw blades.

The first sheets rolled out of Ingersoll Steel Mills five years ago. Rapidly Ingersoll D-B-L began to win wide acceptance, even before the supply of 18-4-1 was curtailed by the shortage of vital alloys. Today Ingersoll D-B-L Steel is a time-tested material with Leading Hack Saw Blade Makers throughout America.

More and more users of hack saw blades are discovering it pays to specify Ingersoll D-B-L . . . the steel that offers more of all 4: Tough Cutting Edges, High Impact Resistance, Relative Freedom from Decarburization, and Lower Cost.

INGERSOLL STEEL & DISC DIVISION
BORG-WARNER CORPORATION
New Castle, Indiana

Plants: New Castle, Indiana; Chicago, Illinois; Kalamazoo, Michigan

*Furnished in the original D-B-L Regular,-"5-4" and D-B-L 2,-"6-5"

INGERSOLL SPECIAL STEELS FOR SPECIAL USES

Alloy Steels
Armor Plate
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Tillage Steels
Soft Center Steels
Shovel Steels
Knife Steels
TEM-CROSS Steel
IngAclad (Stainless-Clad Steel)
Stainless Steels and Saw Steels, including "18-4-1" and Molybdenum and D-B-L Hack Saw Steels

MUSIC WIRE and HIGH CARBON STRIP STEEL

can be substituted for your shortage items!

(Government Surplus Property)

IMMEDIATE DELIVERY THROUGH
RECONSTRUCTION FINANCE CORPORATION

PRICED FOR USE AS SUBSTITUTES

Begin negotiations for your share in large available tonnage of music wire and strip steel.

Shortages of wire and strip steel have put mill deliveries well into the future. Both these items are now on sale at prices to permit substitution for many other grades of wire and strip.

A CONTINUING SALE

This continuing sale by Reconstruction Finance Corporation places at your disposal *new* music steel spring wire in excellent condition, and new high carbon, cold-rolled strip steel, in fair to good condition. The strip steel is in many gauges and widths, mostly in coils. The music wire is well-protected, and is available in various gauges, catchweight coils. Both classifications are priced for use as substitutes for many other grades of wire or strip. The music wire is located in Boston, New York, Philadelphia, Cleveland, Chicago, and Pacific Coast regions; the strip steel in the East and Middle West.

IT'S EASY TO BUY FROM RFC

Sales will be made direct to purchaser. Contact your nearest RFC Disposing Agency for complete information.

ASK YOUR NEAREST RFC DISPOSING AGENCY FOR INFORMATION ON AVAILABILITY OF CARBON BARS, ALLOY BARS AND TOOL STEEL

RECONSTRUCTION FINANCE CORPORATION

A DISPOSAL AGENCY DESIGNATED BY THE SURPLUS PROPERTY BOARD

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BUY WAR BONDS

26

FOR GREATER PRODUCTION . . .

BWH Conveyor Belts

LIMESTONE IS A NO. 1 WAR PRODUCT

It is used in making pig iron, calcium carbide, acetylene gas and synthetic rubber.

Here is a Bull Dog conveyor belt 454 ft. long and 48 inches wide on a boom on the Steamer "Conneaut" owned by the Wyandotte Transportation Company. It has been in service 6 years, during which time it has handled over five million tons of stone and coal.

A BWH belt was chosen for this job because it meets squarely the heavy punishment involved in moving great abrasive masses at high speeds and at minimum cost.

Wherever belts must possess the unusual in ruggedness and dependable long life, be sure to consult our nearest distributor or field technician, or write us direct.

BOSTON WOVEN HOSE & RUBBER COMPANY

FACTORY: CAMBRIDGE, MASS., U.S.A.
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WHEN RUST-PROTECTING STORED WAR MACHINERY...

CALL THE HOUGHTON MAN

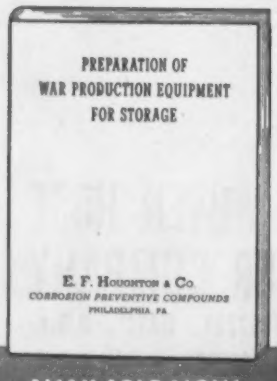
Houghton is ready to help you process plant equipment

Government inspectors who have been instructed on proper preparation of war machines for storage and shipment will check all equipment closely to assure freedom from danger of metal corrosion.

However, the job of processing those war machines is primarily yours—a job that must be done before you can reconvert to peace-time work.

The Houghton Man can help you in this problem. He has been trained during past months on the most efficient methods and procedure. And he has available for you a complete line of rust preventives which meet and *exceed* government specifications, including AXS-673, 674, 934, 1015, USA 2-82, 2-121, and others required in this program.

Backing him with technical advice is a Research Staff with a backlog of 80 years of experience and complete testing facilities. You are invited to use this service . . . to ask for helpful booklets on the corrosion problem . . . and to ask for quotations on preventive compounds required. Write or call E. F. HOUGHTON & CO., 303 W. Lehigh Ave., Philadelphia, or Chicago, Detroit, San Francisco.



AVAILABLE NOW . . . *this complete guide to preparation of war machines for storage, digesting the processing outlined by government agencies. Write for free copy.*

Houghton's

RUST PREVENTION SERVICE

Sixth of a series of Artzybasheff's impressions of the manufacture of steel wire products

Enlarged reproduction free on request

SPAGHETTI SPINNER

A speeding hot steel rod—like a string of red hot spaghetti—emerges from a pipe guide into a spinning steel pan. Thus it ends a trip through 16 stands of rollers that squeeze a billet into a wire rod.

Considerable care and skill are needed to roll wire rods correctly. For a poorly rolled rod will either cause failure in wire drawing or remain as a hidden defect in the wire.

Rolling is one of the many controlled steps in the manufacture of Wickwire Spencer Wire. From the making of the steel in our own open hearths through drawing and processing in our own modern wire mills, every vital production step is subject to careful, competent control.

Wickwire Spencer metallurgists have had many years experience in developing special formulae for widely differing wire needs. Their knowledge of the field is your assurance that they can find the right answer for your problems. Every detail is checked thoroughly to give you high performance at low cost.

Wickwire Spencer can provide the type of wire to meet your requirements. You'll get wire that is uniform in size, tensile and stiffness. That's the way wire must be made to avoid trouble on your wire-working machines. We are equipped to supply high or low carbon wire; round or shaped; in a wide variety of sizes, grades, tempers and finishes.

Send your wire questions to

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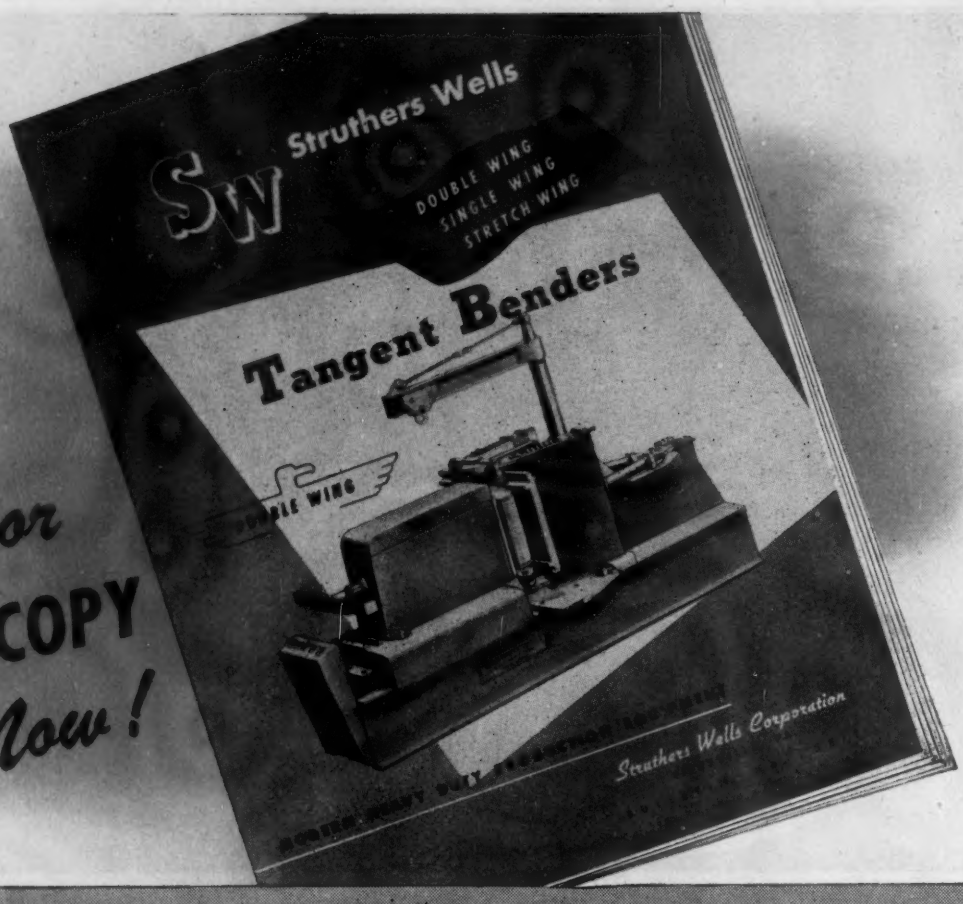

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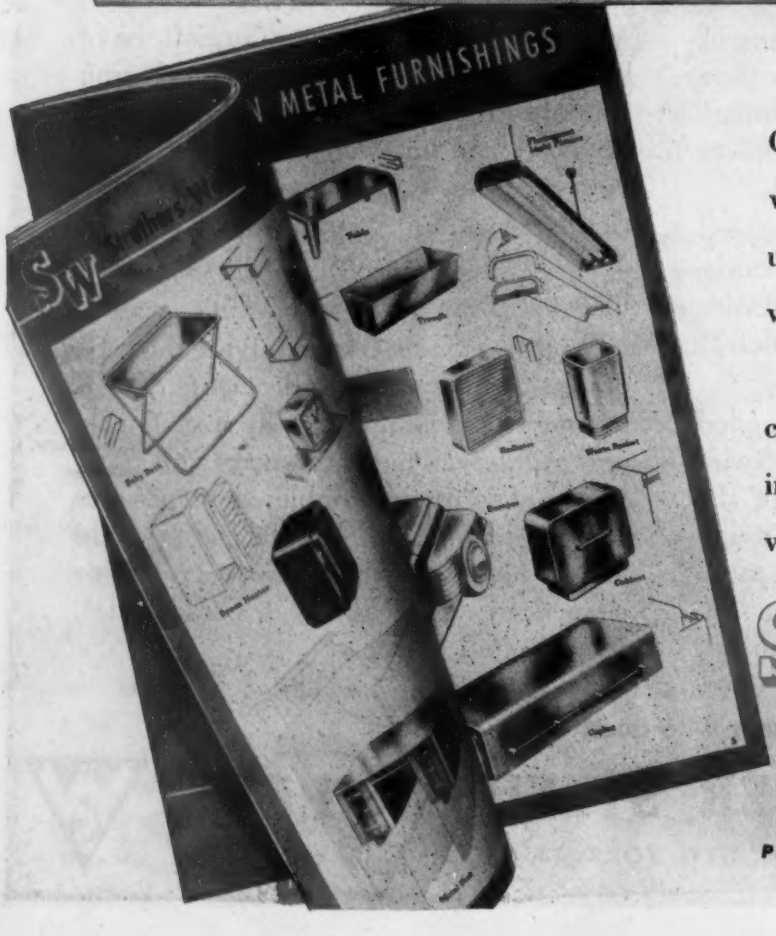

Completely filled from cover to cover with important engineering data, product designs, specifications and other vital information.

If your product involves the fabrication of sheet metal—a copy of this important bulletin should prove invaluable. Write today.

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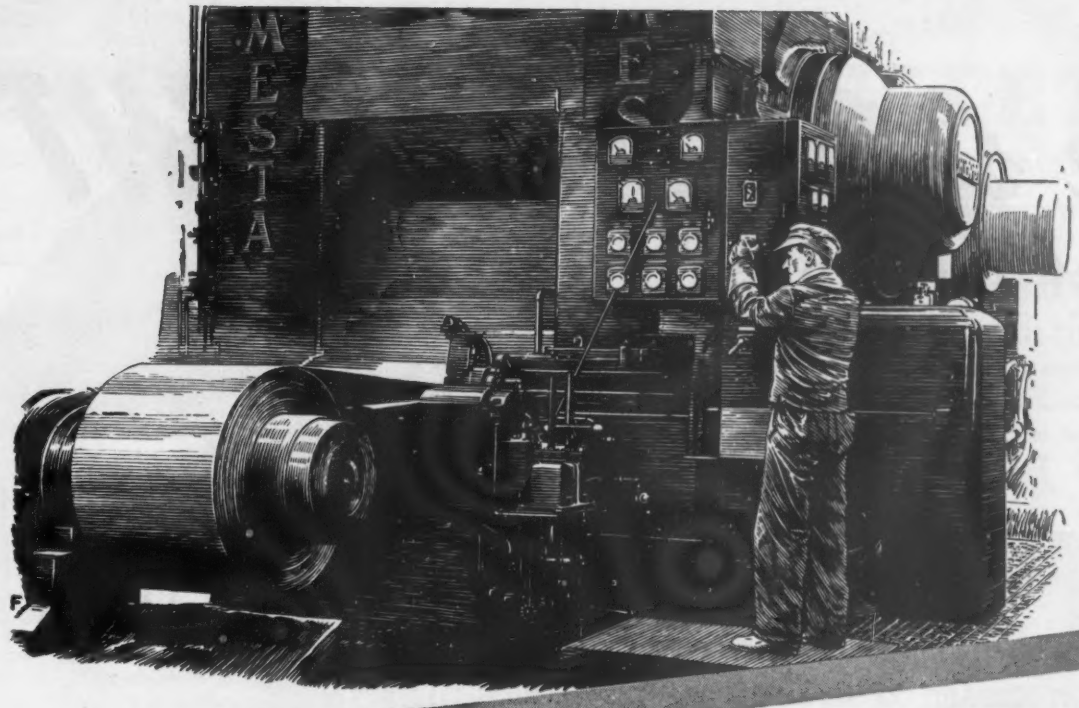

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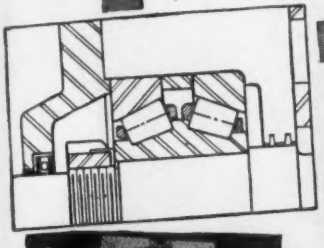

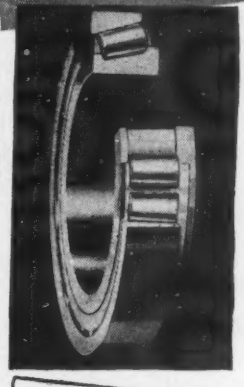

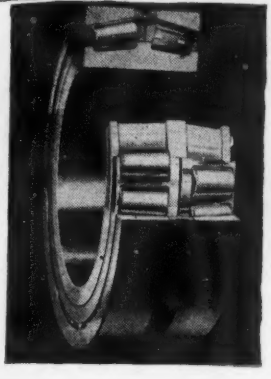

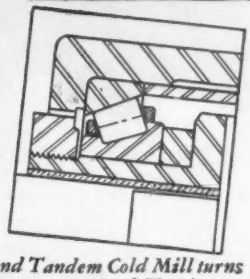

Mesta reel shown with Five Stand Tandem Cold Mill turns on one double-row and two single-row steep angle Torrington Tapered Roller Bearings. Capacity of bearings in pounds at 100 RPM: double-row, radial, 202,100; thrust, 155,200; single-row, radial, 114,500; thrust, 185,000. This is one of many steel mill and other heavy-duty applications where sturdy, efficient Torrington Bearings help speed production.

The reel of the cold mill you see above is one of the world's fastest. It "coils" 3,200 feet of strip per minute . . . and at required tension for final quality control. That means extreme radial and thrust loads on the reel. . . loads handled efficiently by one double-row and two single-row, steep angle Torrington Tapered Roller Bearings.

On steel and paper mill machinery . . . on oil field and hoisting equipment . . . on machine tools and other heavy-duty applications . . . bearings designed and built by Torrington's Bantam Bearings Division provide efficient, economical, trouble-free *anti-friction operation.*

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Advertisement JULY, 1945

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" BRASS CO. *Headquarters for BRASS, BRONZE and COPPER*

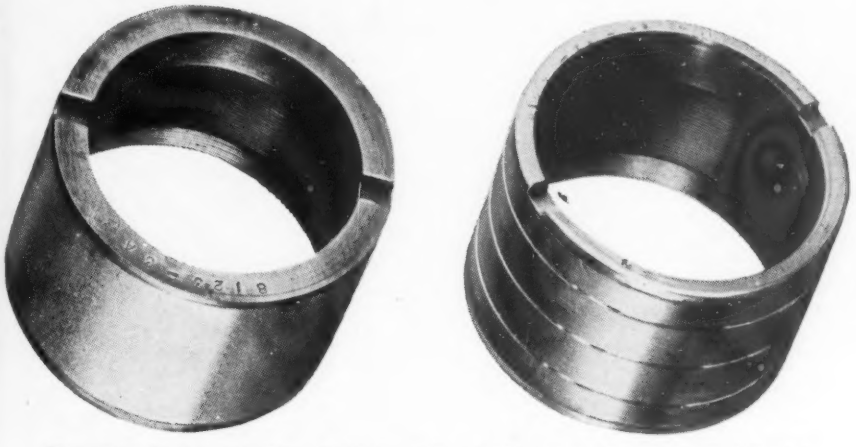
Metal Spraying Processes Greatly Extend Industrial Uses For Copper Alloys

Metal spraying has been known for about 40 years yet it is only within the last ten years that its importance to industry has been recognized. Because of the shortage of critical war material and manpower, metal spraying for repairing worn equipment and, for securing surfaces with the desirable qualities of the more expensive metals has greatly increased. What its possibilities will be in the postwar period depends upon the imagination and the engineering abilities of the enterprising firms who comprise the metal spraying industry.

For those who are not too familiar with metal spraying, briefly, this method consists of feeding metal wire into a portable type spray gun which first melts the end of the wire by means of an oxygen-gas flame and then atomizes the molten metal by means of a blast of compressed air which blows it out in the form of a fine, dense spray. Upon reaching the surface, the particles of sprayed metal chill almost instantly and key themselves into the base metal. Although the sprayed metal coats the object, the finely divided metal droplets do not adhere to it as is the case with brazing. To obtain a strong mechanical bond it is necessary to prepare the surface to produce a multiplicity of minute keys or locks for holding the sprayed molten metal firmly to the surface. This is accomplished by several methods such as (1) a special machining or rough threading operation, (2) roughening or blistering the surface by electric arcing, or (3) by blasting with sand or steel grit. Rough threading provides a satisfactory surface for steel shafts but is not recommended for brass, bronze or steels containing nickel.

The wire used may be brass, bronze, copper, silicon bronze, aluminum bronze, aluminum, lead, tin, iron, zinc, cadmium, babbitt, nickel, various types of steels, monel, stainless, etc. It is possible, therefore, to build up worn surfaces of shafts, bushings, propellers, in fact most any pieces of equipment, with the same or with a superior metal or alloy surface. Small parts which cannot be economically sprayed by hand can be sprayed in a tumbling barrel.

An important application has been to use metal spray for corrosion protection—pure aluminum on duralumin sheets or castings for airplane construction and zinc on steel to replace hot galvanizing. Bronze on steel powder tanks is applied to prevent the danger from sparking. Copper on carbon brushes, soldering surfaces of tin on glass, stainless steel on carbon steel are other common applications. Metal spraying is also used to impart a tough surface to parts subject to wear, thus eliminating the necessity of making the entire unit from a hard-to-machine or more expensive material. Sprayed metal is also used for decorative purposes and takes the standard metal finishes.



Two stages in the production of pistons used on landing gear of P-47 aircraft, following spraying with bronze. The left piston is rough machined and later given the required high finish, with oil grooves, as shown in the view at the right.

An interesting application of metal spraying, as a manufacturing process, is its use for making bronze faced pistons for the Aerol Landing strut used on fighter planes.

Neo Mold Company of Cleveland, Ohio, designed comparatively light steel blanks and sprayed them with Bridgeport bronze to a thickness of about 0.045" on the bearing surface. This is first rough machined, then highly finished with oil grooves. Originally strut pistons were made from bronze castings, and each weighed about seven pounds as compared to about three and one-half pounds for the steel with the bronze bearing surface. The chief advantage is that the bearing qualities of bronze are combined with the strength and rigidity of steel. Since sprayed metal has an extremely fine porosity, the sprayed bronze absorbs and retains oil and becomes self-oiling after short use.

This method is being applied to all types of pistons for compressors and pumps and has fine postwar possibilities. One interesting application is bronze sprayed on aluminum to produce an extremely light, machineable oil bearing that is long wearing. Another interesting application of bronze spraying is the restoration of large bronze paper mill rolls worn and corroded in a number of places between perforations.

Maintenance Applications

Mostly, however, metal spraying is used for repair purposes, salvaging and maintenance. Another important application for metal spraying is designed to prolong the life of equipment subjected to high annealing temperatures. Salt pots, annealing boxes and furnace equipment have been treated successfully to increase service life.

Not all alloys in the form of wire are suitable for use in metal spraying because it is necessary that the sprayed molten metal take the form of tiny balls of metal and not break up into fine dust after it leaves the spray gun. All Bridgeport welding bronze alloys, also possess the necessary qualifications for use in metal spraying because they are specially prepared so that they are free from oxides which are harmful. Micrographs of sprayed metal show that it is made up of tiny particles which are flattened and interlocked. The strength and ductility of the sprayed metal is governed by its physical make-up and not by the physical properties of the wire before it is sprayed. There are a number of additional copper-base alloys, which when processed properly, can be used for special applications. Here much help as to the selection can come from our metallurgical laboratory staff.

Manufacturers of spray guns and accessory equipment have made much progress in the art of metal spraying. Better methods of surface preparation are constantly being developed to increase the strength of the mechanical bond between the base metal and the sprayed material. Improvements are also constantly being made in the spray gun itself in the use of multiple gun setups and in devices to permit automatic operation without sacrificing quality. Metal spraying, of course, has its limitations. The industry looks forward to the day when metal spraying will be commonly used as one of the necessary operations for manufacturing machinery, equipment and the countless everyday articles.

COPPER ALLOY BULLETIN

CAUSES OF CORROSION

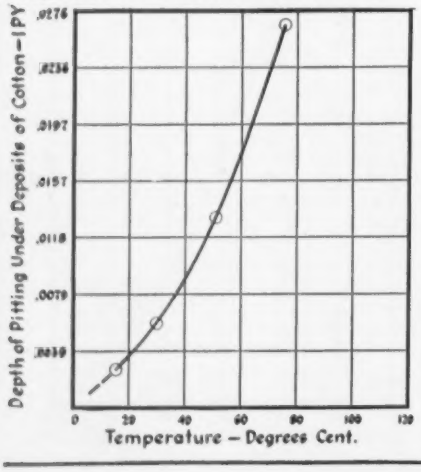
This article is one of a series of discussions by C. L. Bulow, research chemist of the Bridgeport Brass Company.

REDUCING THE HOT WALL EFFECT

As previously stated, the rate of corrosion is increased by high local temperature. This is illustrated by the curve shown in figure A. As low a temperature as possible should be maintained, and uninterrupted heating kept down to a minimum. In addition, all possible steps should be taken to prevent the repeated formation of bubbles of gas in the same location either by constantly shifting the point of bubble formation or where feasible by removing the dissolved air or gas from the liquid before it is heated. The deposition of foreign material on the metal surface should be avoided.

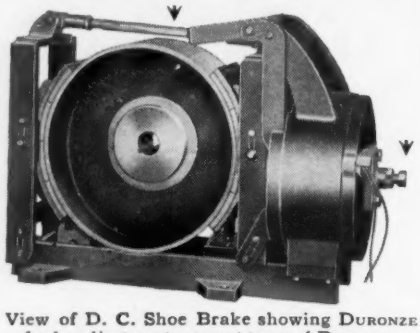
Sometimes it is very difficult to take the steps necessary to prevent the hot wall effect from accelerating corrosion. There are, however, a number of instances where a consideration of the mechanism of the acceleration of corrosion by the "hot wall effect" has resulted in a marked decrease in the corrosion rate. For example, in shell and tube type heat exchangers a corrosive cooling water passing through a metal tube with only a slightly corrosive hot liquid on the outside may fail prematurely. On the other hand, a tube of the same composition but with the hot liquid passing through the tube and cooling water flowing around the outside of the tube will have a normal life. In this instance the rapidly flowing water prevents both the formation of bubbles of gas and the deposition of certain types of foreign material.

EFFECT OF TEMPERATURE ON RATE OF CORROSION OF ADMIRALTY METAL IN 3% SODIUM CHLORIDE SOLUTIONS



Duronze III Adds Dependability to D.C. Brake Adjustment Parts

With increased knowledge resulting from experience in the manufacture of equipment, much of which is designed for automatic operation, designers find it necessary to constantly change metal specifications to meet higher engineering demands. Materials long considered satisfactory are being discarded for newer materials which possess superior properties. Engineers want dependability, freedom from rusting, ease of operation, reduced maintenance and longer service life. The modern trend, therefore, is to subject every component part to a searching examination, to eliminate hidden weaknesses. By eradicating the "weak link," so to speak, products are given a longer lease on life.



View of D. C. Shoe Brake showing DURONZE brake adjustment screw at top and DURONZE torque adjustment screw at right.

The D.C. shoe brakes manufactured by the Clark Controller Company are designed for crane hoists, general mill auxiliaries and similar applications where it is necessary to stop a D.C. motor quickly and smoothly and to hold the load when the driving motor is de-energized or power fails.

DURONZE III, a silicon aluminum bronze is specified for two critical parts of these brakes—the adjustment screw for lining wear and air gap, and the torque adjustment screw.

DURONZE III is admirably suited to these exacting tasks because of its combination of engineering properties... high strength (85,000 psi in the annealed condition, 90,000 psi as a hot forging); exceptional corrosion resistance; good wear resistance; low coefficient of friction when in slow moving contact with most other metals and alloys. From the manufacturer's standpoint this alloy is desirable because it hot forges readily and machines from 50 percent to 75 percent as fast as free cutting brass rod.

DURONZE III and the other Bridgeport engineering alloys furnish an opportunity for alert design engineers to improve their metal specifications and thus make their products better. Write for Bridgeport's revised Duronze Manual—80 pages of the latest specifications and other data with suggested applications for five Duronze engineering alloys.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

Metal Pouring Control for pouring operations in foundries is provided by a photo-electric control, it is claimed. A single operator at a remote station can control pouring of several ladles simultaneously by pushing a button on the control. **No. 619**

A Portable Pyrometer weighing only 1¾ lbs. is claimed particularly adapted to reading the temperature of molten copper, brass, bronze, and other copper alloys and non-ferrous metals. Accurate readings can also be taken of hot air, liquids, and hot surfaces. **No. 620**

A New Chucking Grinder is designed to handle external and internal cylindrical and conical surfaces, generated or formed spherical external and internal surfaces and generated or formed annular surfaces. The construction is said to incorporate features that result in accurate finish and low production costs. **No. 621**

A Surface Grinder incorporating a new "five-in-one" hydraulic control valve is reported to provide increased speed, efficiency, simplicity of operation and greater accuracy. Crossfeed action can be controlled in infinite settings for 0.004 to 0.200 depending on the work. The simplified controls are claimed to measurably improve finishing operations. **No. 622**

A White Finish designed to be electroplated directly over brass, copper, German silver, nickel and ferrous metals is claimed to impart the beauty and durability of a precious metal finish. Only equipment required is a steel tank which serves both for the plating bath and as the anode. Average plating time for decorative finishes is one minute. It is claimed soldering and welding can be performed on this finish. **No. 623**

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SHEETS, ROLLS, STRIPS—*Brass, bronze, copper, Duronze,* for stamping, deep drawing, forming and spinning.

CONDENSER, HEAT EXCHANGER, SUGAR TUBES—For steam surface condensers, heat exchangers, oil refineries, and process industries.

PHONO-ELECTRIC* ALLOYS—High-strength bronze trolley, messenger wire and cable.

WELDING ROD—For repairing cast iron and steel, fabricating silicon bronze tanks.

LEDRITE* ROD—For making automatic screw machine products.

BRASS, BRONZE, DURONZE WIRE—For cap and machine screws, wood screws, rivets, bolts, nuts.

DURONZE ALLOYS—High-strength silicon bronzes for corrosion-resistant connectors, marine hardware: *hot rolled sheets* for tanks, boilers, heaters, flues, ducts, flashings.

BRASS "Bridgeport" CO.

Established 1865

COPPER WATER TUBE.

FABRICATING SERVICE DEPT.—Engineering staff.

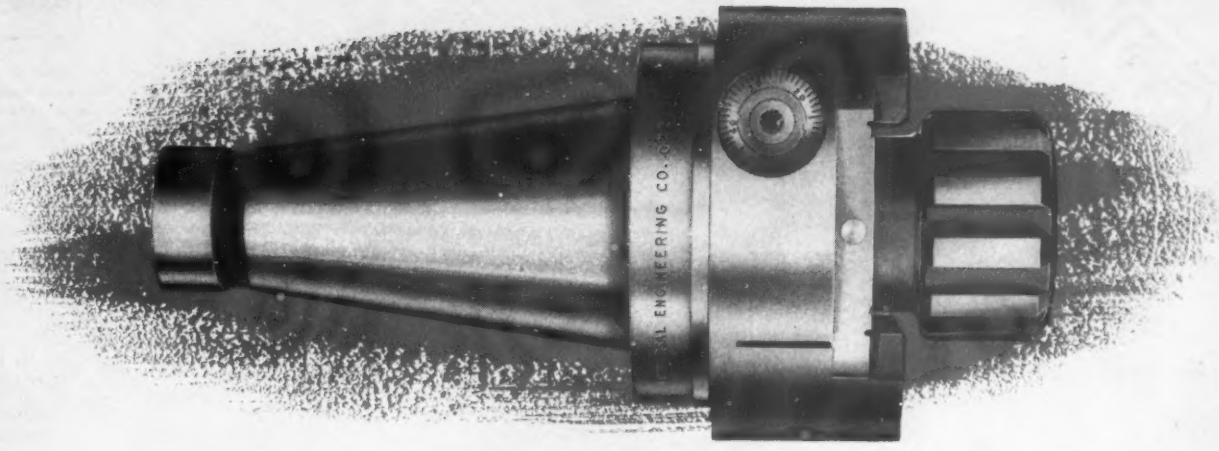
BRASS AND COPPER PIPE

Note: Bridgeport products are supplied in accordance with existing priority regulations.

*Trade name.

BRIDGEPORT **BRASS**

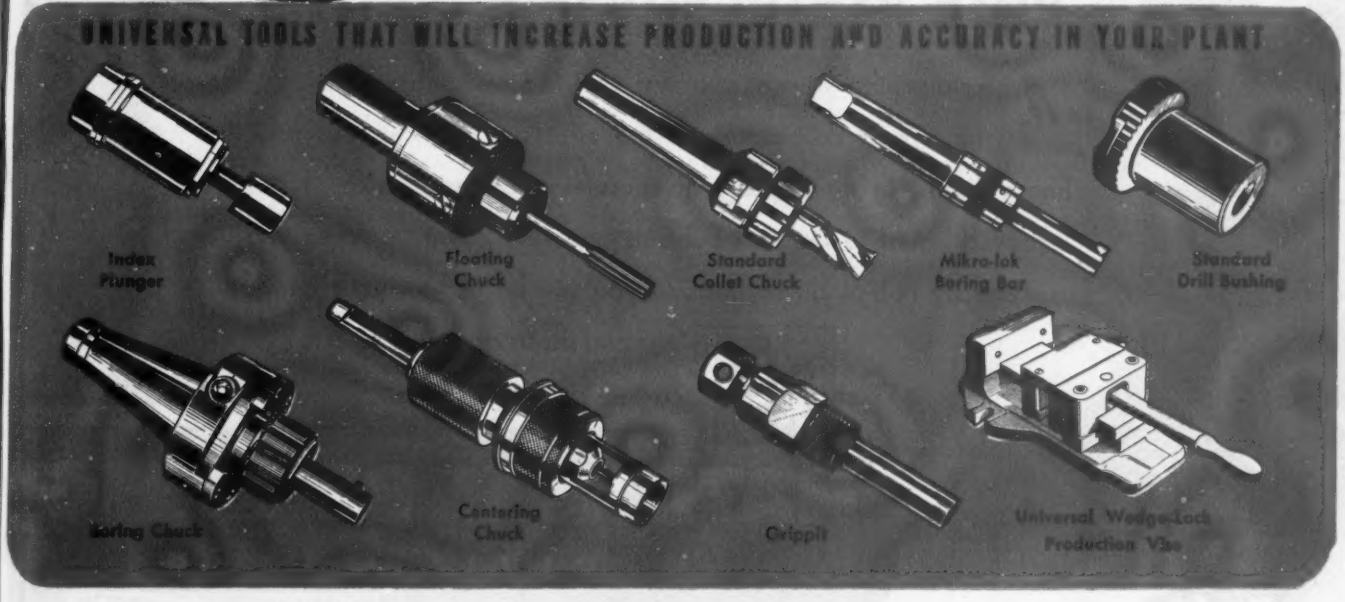
UNIVERSAL BORING CHUCKS GRIP TIGHT • IMPROVE ACCURACY • SPEED UP OPERATIONS



Universal Boring Chucks, made for boring mill and milling machine use, speed efficient boring at reduced cost because they are engineered to minimize chances for error and constructed to deliver dependable performance on the job year after year. Here are a few of the many advantages incorporated in the design and construction of these modern tools:

- Special design allows boring bar to be advanced or receded to a length to suit the work.
- All wearing surfaces hardened and ground.
- Anti-back-lash arrangement of adjusting screw permits extremely accurate setting of cut—accurate to .0005".
- Positive reference point to bring collet on center permits centering, drilling, etc., previous to boring operation.
- Flat retainers which grip slide are easily brought to proper adjustment by grinding face of chuck.
- Large feed dial can be adjusted to zero setting at any position in feed range.
- Made to accommodate bars from ⅜" to 1".

Write for complete particulars about Universal Boring Chucks and other superior Universal tools.



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Carbon dioxide gas cannot contaminate or dilute valuable liquids. Used on electrical fires, it will not soften or water-soak insulation. It's a non-conductor too — there's no danger of short circuits, or of shock to the operator. And there's no after-fire mess to be cleaned up.

Kidde portable extinguishers for small, isolated blazes in flammable liquids and electrical equipment; wheeled units and built-in systems for major hazards — all are deadly to fire, and *only* to fire. The Kidde line includes the *right* kind of protection for every tough-fire hazard in the accompanying list . . . ask a Kidde representative for full information — he's skilled in the ways of fire protection.

* * *

KIDDE KILLS TOUGH FIRES *in Process Rooms, Ovens, Spreaders, Motors, Storage Rooms, Mixers, Coaters, Transformers, Dip Tanks, Agitators, Washing Trays, and Control Panels.*

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The development of uniform standards has materially reduced the variety of items made, simplifying your buying problems; the use of modern precision methods in the manufacture of fasteners, assures interchangeability and accurate fits.

To guide the designer and fabricator of products and structures of all types and sizes, there is available a wealth of authoritative design data. When you base your designs upon this proved engineering data and the known properties of fasteners, you can have complete confidence in the ultimate results.

Write We will be glad to put your name on the list to get FASTENERS, a periodical containing data and ideas on the application of headed and threaded products.

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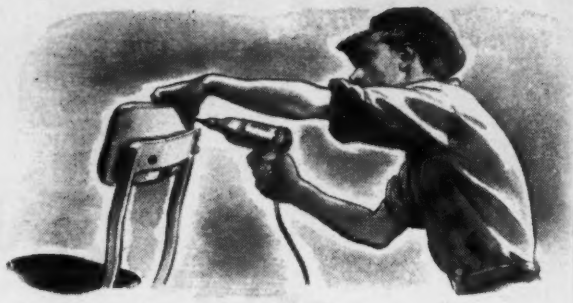
TROUBLE CHASER!

Even though carefully hand driven, and then smoothed up, slotted screws spelled trouble for this well-known typist's chair manufacturer. Some burrs got by inspectors, snagged steno's stockings.



OUTPUT PACER!

But burrs became a memory when he switched to Phillips Recessed Head Screws. Better still, workers, freed of the dangers of finish-scarring driver skids, boosted output plenty with fast power-driving.

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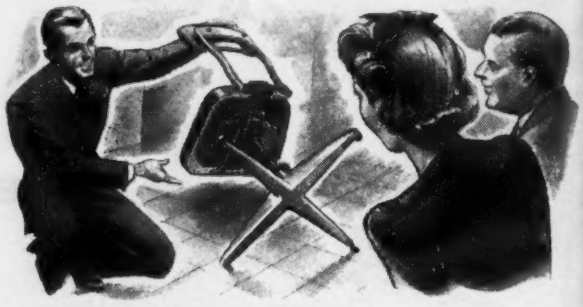

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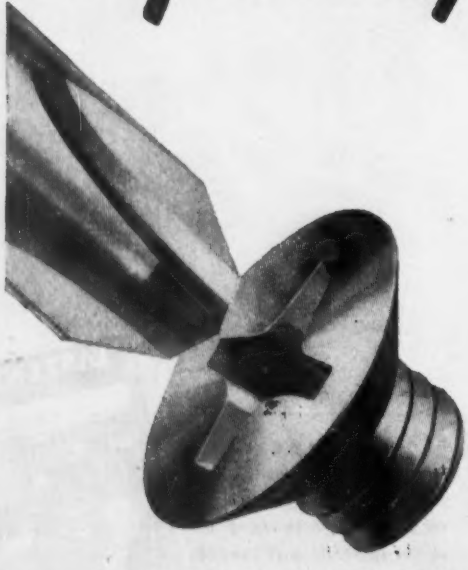

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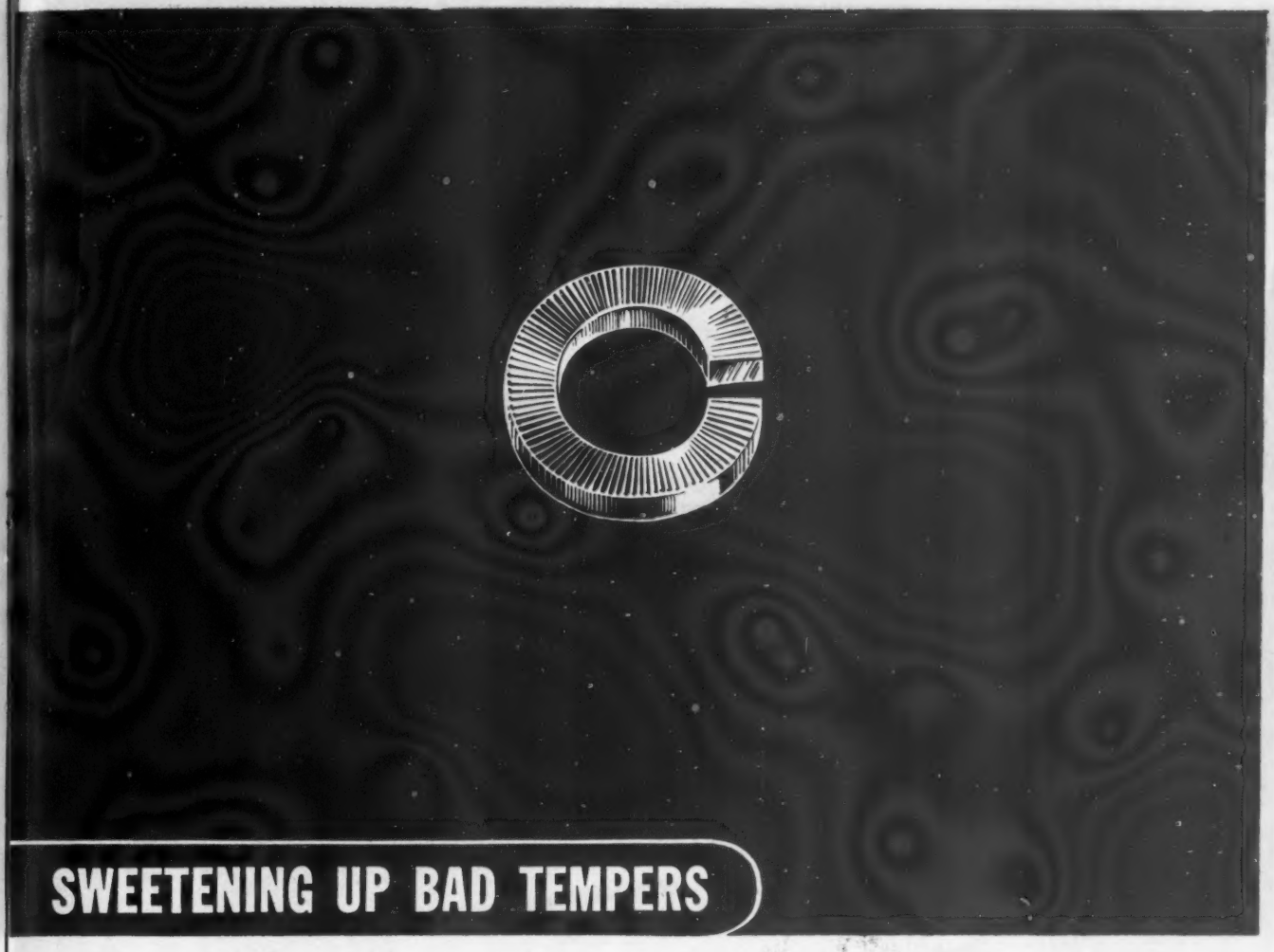

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STEEL

The Magazine of Metalworking and Metalproducing

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STEEL
July 16, 1945

Antidote for Fear

Anybody who has read recent issues of some newspapers put out by CIO and AFL unions for their members must be alarmed at the abundance of bear stories on the state of employment after V-J Day. Many of the editors of union journals are telling their readers that cutbacks are going to be severe, that there will not be enough jobs to go around and that the federal provisions for unemployment assistance are woefully inadequate.

It is difficult to see how a normal employe who reads this highly distorted editorial material can escape acquiring a strong fear complex regarding his postwar job. Perhaps this fear of the future, partly developed by the alarmist propaganda in union publications, is responsible for the present wave of work stoppages. It is not unreasonable to believe that the uninformed worker, having been told that job insecurity is ahead, acts now to get all he can get while getting seems possible.

However, there must be an antidote for fears that are not justified. It is likely that if the average union member could know how much effort is being made to insure a maximum of postwar employment, his fears would be allayed. For instance, if all the reports of expanded activity for postwar issued by Paul Hoffman's Committee for Economic Development were read by employes, their fear for the future would turn to confidence.

Individual companies can do much to offset the fear propaganda. Recently the John A. Roebling's Sons Co. ran a 32-page supplement in the "Trenton Sunday-Times Advertiser." This supplement, generously illustrated with excellent reproductions of Roebling facilities and personnel, explained how this veteran company plans to meet the challenge and responsibilities of peace.

Pictured is a miniature suspension bridge reflecting radical departures from accepted practices in bridge construction. The new principles will be incorporated in postwar bridges. "As soon as materials and manpower are available, work will start on a number of major bridge projects that are now on the drawing boards . . . assuring jobs for thousands of engineers and workmen all over the country."

This and other statements in the supplement must have had a reassuring effect upon the townspeople and employes in Trenton and Roebling.

Thousands of industrial companies have definite plans for expanding activities after V-J Day. If these plans could be made known to the people in the affected communities, they would serve as a powerful antidote for the present all-too prevalent fear complex among employes.

ETHICS IN GOVERNMENT: Of President Truman's six appointees to cabinet posts, three have unusual opportunities to lift the ethical standards of federal administration to a higher plane. The three are Fred M. Vinson, secretary of the treasury; Tom C. Clark, attorney general; and Lewis B. Schwellenbach, secretary of labor.

One much needed reform is to administer justice so that criminals can be punished for all the crimes they commit and not alone for evasion of income tax laws. It is a disgrace that the Internal Revenue Department has to be prostituted to jail a gangster because the proper authorities cannot convict him on offenses ranging up to grand larceny, arson and murder. Also obnoxious and downright dishonest is the capital stock tax which forces corporate taxpayers to gamble. It should go.

The "consent decree" or flagrant abuses of it should be abandoned. It is unfair to bribe a corporation or individual to plead guilty when innocent

(OVER)

by trading a $5000 fine for the $100,000 cost of proving one's innocence.

Another injustice which should be discontinued is the practice of the government of settling labor disputes by seizing the property of the employer, who often is not a principal in the dispute.

These are a few of the reforms needed to re-establish a higher degree of integrity in government.

—p. 92

• • •

13 TO 1 IMPROVEMENT: Associate Editor George Birdsall's article on high speed drilling, reaming and tapping reports the number of holes an operator can ream, drill or tap in a 10-hour shift working on improved modern equipment. If memory serves me correctly, the piece-work rate on one of these jobs in a shop where this writer worked in 1908 or 1909 was 2 mills a hole and a drill press operator had to work hard to make 34 or 35 cents an hour. At that same piece-work rate, an operator, using the equipment described by Mr. Birdsall, today would make $44 in a 10-hour shift, or $4.40 per hour. Assuming equal proficiency on the part of the operators, the increase from 34 cents to $4.40 per hour represents a 13 to 1 improvement in the productivity of machines in a 37-year period.

Perhaps it is this type of improvement in the tools with which men work that has made industrial America such a marvelous arsenal for democracy in this war.

—p. 113

• • •

PRUNING DEAD WOOD: In line with President Truman's objective of co-ordinating and simplifying government administrative agencies, RFC has absorbed five subsidiaries—Rubber Reserve Co., Metals Reserve Co., Defense Plant Corp., Defense Supplies Corp. and Disaster Loan Corp.

Considering the large number of separate agencies still in existence, this merger of only five units may seem to be trivial. Nevertheless it is significant in that it is one of the Truman consolidation moves which signalizes a reversal of the tendency under his predecessor's administration to habitually create new agencies without abolishing the full-flown officialdoms which they superseded.

The RFC consolidation is encouraging. If it is followed by the obviously desirable liquidation of some hundreds of other stray offices, divisions, authorities, sections, branches and corporations, the result will be gratifying to the corporations and individuals who pay the freight of top-heavy government. Co-ordination and simplification is a major "must" in government policy for postwar stability.

—p. 94

SIGNS OF THE TIMES: Last year a joint committee of SAE and AISI set up hardenability bands for 37 standard SAE and NE steels. Now the committee has approved similar bands for 35 additional SAE and NE steels (p.116) and is setting up bands based upon modified chemical compositions for every steel in the standard steel list. Later a complete series of bands will be worked out for each steel based upon original compositions. This undertaking is important; it gives steelmakers more latitude in chemical composition at the same time it guarantees steel users closer adherence to hardness values they select. . . . Washington Steel Corp., a new steel company whose directorate includes many names well known in steel circles (p. 110), will begin operations early in 1946 in the plant formerly owned by the Washington Tin Plate Co. The new company will produce stainless steel in sheet and strip form. . . . NAM is advocating a uniform federal statute of limitations (p. 95) to protect business and industry from heavy penalties which may be made retroactive under numerous laws enacted during the past decade. . . . J. A. Krug, chairman of WPB, reports war production in 1944 (p.97) included 96,359 planes, 30,889 ships, 17,565 tanks, 595,330 army trucks, 10,738 field guns and howitzers, 215,177 bazookas and 1,416,774 tons of ground artillery ammunition. This is a highly creditable score. . . . Monitors of motordom opine that Ford Motor reaped a million dollars worth of publicity (p. 99) in leading the field in introducing 1946 models. Ford expects to have each of its 6000 dealers stocked with at least one car by Labor Day. . . . Co-operation of companies identified with tool and die manufacturing has made it possible for Percy Jones General Hospital, Battle Creek, Mich., to set up an exact replica of an automotive tool shop (p. 100) for the training of wounded and handicapped veterans. . . . Peak of freight traffic due to redeployment for the Pacific war is expected next April (p. 83), according to Army officers. Railroads will carry nearly 90 per cent of the tonnage involved. . . . Heavy metalworking equipment, particularly heavy presses (p. 88), may prove to be a serious bottleneck in the reconversion problem. . . . A shift in personnel of this publication, involving merited promotions for both men, takes R. L. Hartford from Pittsburgh to research and promotion in Cleveland (p. 103) and moves J. C. Sullivan from Cleveland to Pittsburgh as resident editor.

E. L. Shaner

EDITOR-IN-CHIEF

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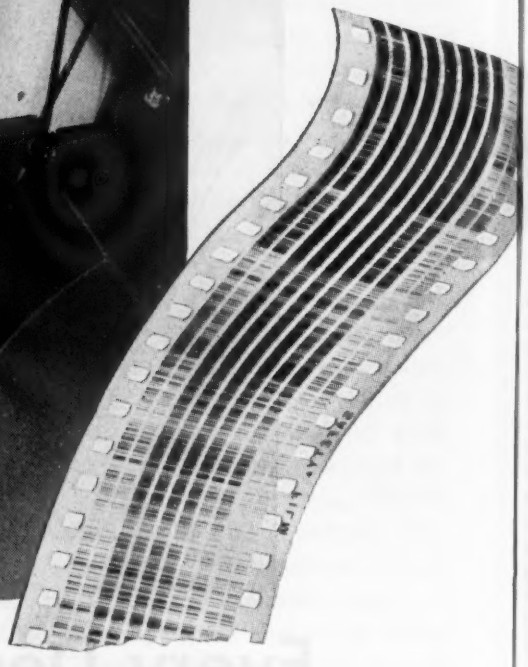

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Redeployment To Tax Transport

Mass movement of military personnel and materials to Pacific theater of operations confronts railroads and other common carriers with greatest transportation task in history. Western roads to bear brunt of burden

REDEPLOYMENT of the nation's armed might to the Pacific theater of operations confronts the railroads and other common carriers with the greatest transportation task in history.

Mass movement of men and materials to Pacific embarkation points, now under way, will accelerate over the next six to eight months. Already the effect of the military traffic burden on the railroads is reflected in drastic curtailment of passenger carrying facilities for the civilian population.

The immensity of the task cut out for the nation's transportation system is staggering. Not only must it serve as the central link in the redeployment of the armed forces from Europe to the Pacific but it must simultaneously carry on the job of serving a tremendous war production program and an expanding civilian economy as industry reconverts to peacetime goods manufacture.

Use of the railroads in the movement of military personnel is expected to attain peak in December when about 1.5 million military personnel will be crisscrossing the nation in pullmans, coaches, hospital cars and troop sleepers. Maj. Gen. Charles P. Gross, chief of transportation, Army Service Forces, recently predicted that the war's previous peak in rail transportation of military personnel will be exceeded repeatedly during redeployment operations.

He pointed out that the high date in rail transport of armed forces occurred in August, 1943, when organized movements — 40 or more men — totaled 1,104,426. This figure will rise to 1.5 million in December this year, he said, while travel by troops as individuals on furlough, emergency leave, passes, etc., will increase the travel total of military personnel in December to a total of approximately 2,000,000.

In his recent report as director of War Mobilization and Reconversion, Fred M. Vinson said that redeployment of troops, liberal furloughs and relocation of labor during the reconversion period added to essential civilian travel, will push passenger traffic up to 107 billion passenger miles, 10 per cent above the record established in 1944. In the redeployment of troops it is estimated that each soldier

Soldiers enroute to the West Coast attempt to sleep in crowded day coaches. The congestion in this type of traffic was largely responsible for the restriction on use of pullmans by civilians. NEA photo

will be moved at least six times: From Atlantic arrival port to staging area; to distribution center nearest his home; to his home; to an assembly center; to West Coast staging area, and finally, to shipside. For the peak redeployment month, December, the Transportation Corps will require 24,500 pullman cars, 11,385 coaches and 6375 baggage cars.

At the same time that passenger and troop traffic is mounting the freight load will continue near peak. In his report Director Vinson said it is estimated the railroads will have to carry 724 billion ton-miles of freight over the next 12 months, only 3 per cent below the peak set in 1944. Actually, the freight traffic peak is not expected by the Army until April of next year when in excess of 11,000,000 tons will be hauled by carriers of all kinds. Highway motor transport is expected to accommodate from 9 to 10 per cent of the load, inland waterway facilities 2 per cent, and the remainder the railroads.

Freight car loadings in the third quarter of 1945 will be slightly below the total in the same quarter of 1944, according to the thirteen Shippers' Advisory Boards. Loadings for twenty-eight principal commodities will be 9,864,374 cars in the period compared with 9,970,452 actual car loadings for the same commodities in the corresponding three months in 1944, a decrease of 1.1 per cent. Four of the thirteen Shippers' Advisory Boards estimate increased loadings while nine anticipate decreases.

Following tabulation shows estimated loadings for each district for the third quarter of 1945, and the percentage of increase or decrease over the 1944 period:

Shippers' Advisory Boards	Estimated Loadings Third Quarter 1945	Per Cent Increase
New England	179,135	2.7-D
Atlantic States	1,087,020	1.5
Allegheny	1,235,974	1.2-D
Ohio Valley	1,156,240	4.0-D
Southeast	975,259	5.2-D
Great Lakes	642,836	2.3-D
Central Western	376 671	3.7
Mid-West	1,285,019	0.4
Northwest	862,414	0.2-D
Trans-Missouri-Kansas	508,336	0.9-D
Southwest	720 853	2.3-D
Pacific Coast	510.961	4.3
Pacific Northwest	323,656	0.7-D

The Shippers' boards expect increases in third quarter loadings of fifteen of the commodities listed, but decreases in thirteen. Among those indicating increases are: Agricultural implements and vehicles other than automobiles, 10.8 per cent; grain, 10.4 per cent; brick and clay products, 6.2 per cent; cotton, 4.3 per cent; paper, paperboard and prepared roofing, 3.9 per cent, and manufactures and miscellaneous, 2 per cent.

Commodities for which decreases are estimated include: Petroleum and petroleum products, 8.2 per cent; machinery and boilers, 8 per cent; gravel, sand and stone, 5.7 per cent; ore, 5 per cent; lumber and forest products, 4.3 per cent, and coal and coke, 2.1 per cent.

While overall freight movement is expected to be down slightly this fact is deceptive of the traffic picture since shipments will be dislocated far from normal, the burden on the western carriers being sharply increased. The western railroads, carriers in the West, are widely dispersed and in many instances single-track. This fact, coupled with the longer hauls entailed, will tie up equipment for much longer periods than ordinarily would be the case.

As for the state of transportation equipment, after several gruelling war years of unprecedented use, wear and tear and obsolescence are removing facilities from the rails and the highways almost as fast as new equipment is being made available. Some relief in this respect may be forthcoming over closing months of this year as more motor carriers and some additional railroad equipment are made available. Orders for cars for use on domestic railroads in the first six months were only about one half the total of the like period a year ago, however, being estimated at 14,766 units compared with 28,391. Freight cars on order on June 1 amounted to 35,497 and this number is expected to be increased.

Future Improvement Seen

Indications of some future improvement in the transportation equipment situation are seen in the allotment of increased quantities of controlled materials by the War Production Board for third quarter. Construction of new railroad passenger cars is now authorized for the first time since 1942, but, said the Office of Defense Transportation, none will be in production until early in 1946.

Total allocations of carbon steel for transportation for the third quarter are 1,339,588 short tons, the ODT said, the largest for any quarter of 1945. This allotment amounts to 87 per cent of the ODT requirement of 1,532,136 tons, as compared with only 70 per cent of the program in the second quarter.

Carbon steel allotments for the more important transportation items in the third quarter are as follows: Replacement rail, 495,900 tons allotted for railroads, 13,500 for transit lines; for locomotives, 41,500; freight cars, 220,000 tons have been allotted for covering the present schedule of about 11,000 to be built in the fourth quarter; passenger train cars, 5000 tons allotted, plus 5500 tons of alloy steel to produce 250 coaches, head-end cars and non-luxury type diners, and start a program of 250 passenger cars quarterly beginning the

first quarter of 1946; track accessories, allotment 244,500 tons for railroads, 4500 tons for transit lines; highway transport, allotments granted to meet requirements of programs currently authorized by WPB. Steel for integral buses actually exceeds the stated program of 8300 tons by 4700 tons to permit the production of 1100 additional units in 1945, making the entire year's production approximately 10,000. The third quarter allotment of steel for trucks is 76,600 tons, which will, according to present estimates, bring the entire year's production to 186,000 units. Other allotments are: For street cars, 950 tons; bus bodies, 6000 tons; trolley coaches, 300 tons; trailers, 9200 tons; third axles, 500 tons. Automotive replacement parts, allotted, 155,000 tons; water transport, 28,000 tons allotted; petroleum and liquid transport, 438 tons allotted, for tank trailers; alloy steel, 128,840 tons allotted.

At least 1800 more skilled workers are needed by the transportation equipment industry if an immediate increase in railroad freight car production from 4000 to 8000 cars a month is to be attained, the WPB stated recently.

The labor problem is already so acute, and the railroads are so congested, it was said at a meeting of the WPB Labor Advisory Committee on Transportation Equipment, that in the Middle West grain and crop movements are impaired for lack of freight cars, and farther west, there have been instances where trunk line trains have been unable to start because of shortage of crews.

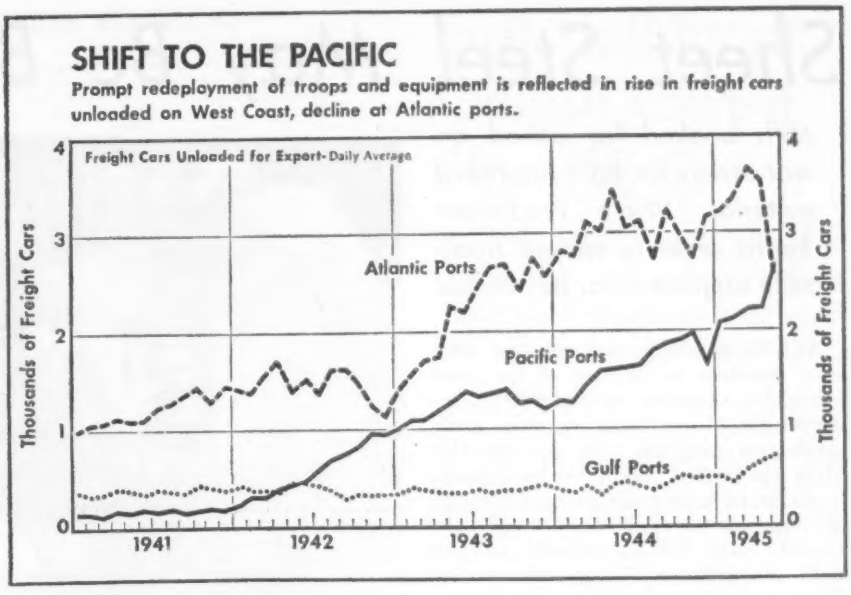
Shortage To Continue

Brig. Gen. C. D. Young, ODT deputy director, told the committee that an extremely serious transportation problem lies ahead, and that this condition will continue for at least a year or 18 months. In fact, the general declared, transportation equipment needs will continue until after the defeat of Japan, if not longer.

Alfred Lawrence, assistant to the director, Transportation Equipment Division, WPB, declared that practically all foundries producing equipment for railroad cars, although on the "critical" list, are running into a series of strikes, which are rendering the situation extremely dangerous. He called upon the industry to endeavor to recruit workers into the railroad car production industries, since already a production backlog of approximately 8000 freight and flatcars exists. He said 15 companies in railroad car production are experiencing a shortage of some 1800 men, such as welders, riveters, upholsterers, molders, etc., which explains why production is 8000 cars behind schedule. In addition to this shortage, as of June 1, Mr. Lawrence said ODT wanted for military purposes some 1600 sleeping and kitchen cars for redeployment of the armed forces.

Clinton S. Golden and John L. Beck-

(*Please turn to Page* 208)



Present, Past and Pending

■ HAUCK RESIGNS WPB POST; ALLEN PROMOTED

WASHINGTON—William A. Hauck has resigned as chief, Control Branch, Steel Division, War Production Board, to join Reconstruction Finance Corp. where he will assist in disposal of surplus steel plants. R. C. Allen has been appointed vice chairman, Office of Metals and Minerals, WPB, succeeding William C. Keeley who is resuming his position as vice president, Air Reduction Co., New York.

■ ELECTRIC AUTO-LITE PLANS NEW SHARONVILLE PLANT

TOLEDO, O.—Electric Auto-Lite Co., this city, has acquired a tract of land at Sharonville, O., for a new plant to manufacture material for the Navy.

■ WHEELING STEEL TO RECONSTRUCT THREE FURNACES

PITTSBURGH—Contract for reconstruction of three heating furnaces in the hot strip mill at the Steubenville, O., works, Wheeling Steel Corp., Wheeling, W. Va., has been awarded to Rust Furnace Co., this city.

■ TIN SUPPLIES DROP 70 PER CENT SINCE 1942

WASHINGTON—Available supplies of pig tin have dropped 70 per cent since Jan. 1, 1942, to 23,654 tons as of May 1, after allowing for an 18,000-ton minimum working inventory and government stockpiling.

■ SPECIAL SALE RESTRICTIONS LIFTED ON FIVE METALS

WASHINGTON—Restrictions on special sales of chromium, copper raw materials, inconel, monel and nickel have been removed by WPB.

■ MAVERICK DEPLORES SLOWNESS OF SURPLUS DISPOSAL

PITTSBURGH—Surplus property disposal must be speeded up or it will turn out to be the worst scandal of the war, Maury Maverick, chairman, Smaller War Plants Corp., stated here last week.

■ SENATE GROUP TO HIT CONCENTRATION OF STEEL INDUSTRY

WASHINGTON—Concentration of the steel industry in the East is hit in a forthcoming report to a senate subcommittee which has been studying development of the western steel industry.

■ SPB MEMBERS MAKE WESTERN STEEL PLANT PROPOSAL

WASHINGTON—Col. Edward H. Heller and Robert A. Hurley, members of the Surplus Property Board, suggested last week that western capital organize to operate government-built western steel plants. Under the proposed plan, financing might be done through public subscription.

■ RETIRING STEEL DIVISION OFFICIALS HONORED

WASHINGTON—A dinner was given here last Thursday for the following officials of the WPB Steel Division who are leaving the organization: Harry M. Francis, assistant director; Clark W. King, assistant to director; R. A. Marble, plate section; R. W. Shannon, directive committee; George F. Hocker, forging and castings section; G. Russell Link, steel products section.

Sheet Steel May Be Bottleneck

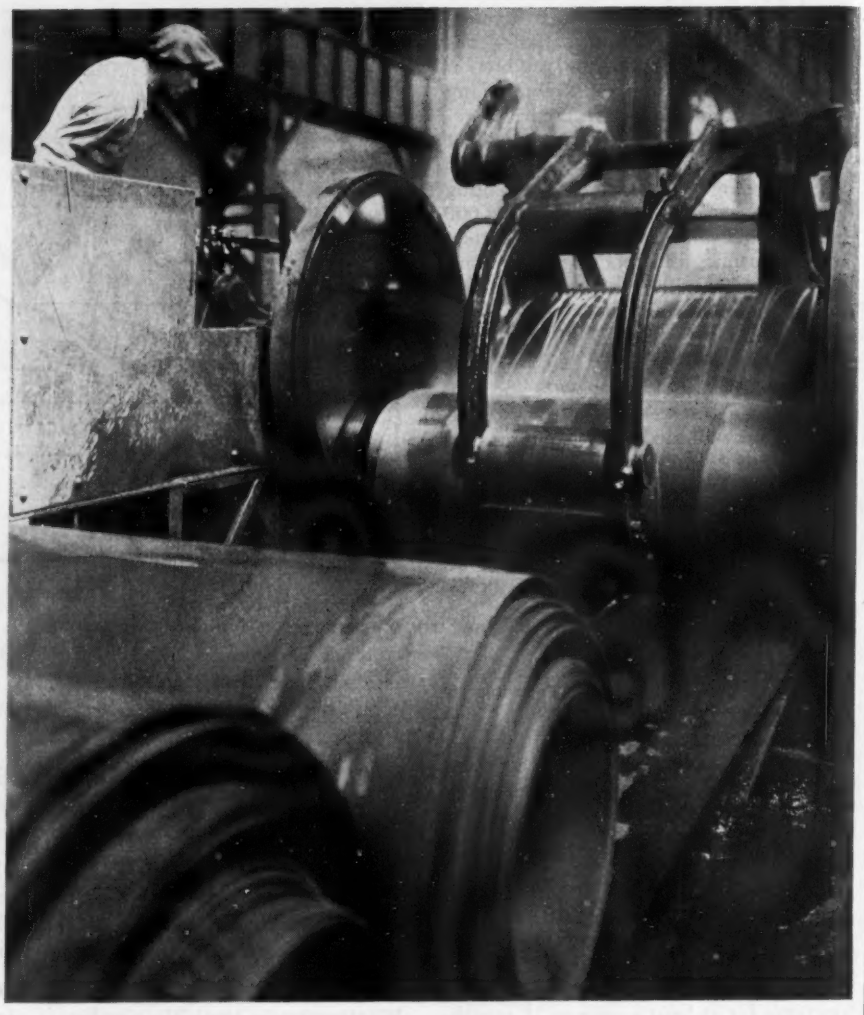
Mills booked far ahead on war orders for light flat-rolled material. War Production Board seeks to spread available supplies as far as possible

ACUTE shortage of sheet and strip steel threatens to be one of the most formidable obstacles in the path to reconversion of consumer durable goods production over the next few months. Mills are booked solidly on both items, bookings in some cases running through the first quarter of 1946. Cancellations to date have been practically nil and mills can promise little in deliveries of these products in the foreseeable future.

Unless third-quarter war steel requirements are reduced and war contractors cancel part of the rated tonnage now on mill books, the outlook for automakers, manufacturers of refrigerators, washing machines and other similar items getting an early start in volume production is not promising.

Steel warehouses have short stocks of sheet and strip and can offer no substantial assistance to such manufacturers. Rejects or secondary material likewise is in short supply and while some dealers anticipate an easing within the next 60 days, they are not optimistic as to the quantity of sheets and strip that will become available. Surplus stocks which have been offered by government disposal agencies recently have contained only limited amounts of light flat-rolled material and some of this has been of unsatisfactory quality.

Recognizing that sheet and strip may easily become a serious reconversion "bottleneck," the War Production Board has started a series of moves to spread the available supplies as far as possible.



Steel sheets 69 inches wide are being coiled after rolling on the 96-inch mill of Carnegie-Illinois Steel Corp.'s South Chicago Works. Each of the coils weighs 4200 pounds. Coiler operates at a speed of approximately 900 feet per minute

"Freeze" Order Revised

On July 5, WPB "froze" third-quarter steel rolling mill order books for most types of sheet and strip in an effort to obtain concrete information regarding all open spaces on mill schedules for these products. Late last week order books for these products were reopened for July and August for all firms and for the entire third quarter for small businesses (those producing $50,000 or less per quarter). The freeze order was lifted to avoid a possible loss of production, WPB explained.

Steel products affected by the order are: Plain hot-rolled sheet and strip, 16-gage and lighter; hot-rolled pickled sheet and strip, all gages; cold-rolled sheet and strip, all gages; galvanized sheet, all gages; silicon sheet and strip, all gages.

Open spaces on rolling schedules are expected to result from military cancellations and from other actions recently taken by the WPB. It is upon these expectations that WPB is basing its hopes that materials may be made available for reconversion purposes.

WPB recently sent telegrams to all mills producing sheet and strip requiring them to report to the WPB Steel Division on the cancellations of outstanding orders to be produced in the third quarter. These orders must be listed by the month for which the orders are scheduled for production and according to grade.

Earlier, WPB had ordered a 25 per cent reduction in the permissible inventories for sheet and strip. This reduced permissible stocks from 60 days to 45 days' supply. Small consumers using not more than 25 tons a month are permitted to carry up to a 60-day supply.

Other steps taken by WPB to combat the threatened chokepoint include:

1. Investigations by WPB's field staff of steel users' inventory and purchase order positions, particularly in sheet steel. Compliance action may be taken against violators of WPB regulations.

2. More effective use of manufacturers' inventories of idle and excess sheet and strip steel.

3. Increased sheet and strip steel production from present facilities through a recruiting drive for 2000 men and proposed expenditure of $55 million by private industry for new flat-rolled finishing facilities.

4. Rescreening of all third-quarter and proopsed fourth-quarter steel allocations to adjust CMP tickets to the needs of a one-front war.

WPB Chairman J. A. Krug says best estimates available indicate reconversion

STEEL INGOT PRODUCTION STATISTICS

	Estimated Production—All Companies								Calculated weekly production, all companies Net tons	Number of weeks in mo.
	—Open Hearth—		—Bessemer—		—Electric—		—Total—			
	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.		
Based on reports by companies which in 1944 made 97.9% of the open hearth, 100% of the bessemer and 86.7% of the electric ingot and steel for castings production										
1945										
Jan.	6,468,815	90.5	379,062	76.0	358,346	77.3	7,206,223	88.8	1,626,687	4.43
Feb.	5,967,842	92.4	347,227	77.1	339,520	81.1	6,654,589	90.8	1,663,647	4.00
Mar.	6,927,377	96.9	398,351	79.8	382,237	82.4	7,707,965	95.0	1,739,947	4.43
1st qtr.	19,364,034	93.3	1,124.640	77.6	1,080,103	80.2	21,568,777	91.6	1,677,199	12.86
Apr.	6,541,097	94.4	372,952	77.2	377,877	81.4	7,291,926	92.8	1,699,750	4.29
May	6,662,827	93.2	402,100	80.6	385,876	83.2	7,450,803	91.8	1,681,897	4.43
June	6,159,348	88.9	379,828	78.6	329,541	73.4	6,868,717	87.4	1,601,100	4.29
2nd qtr.	19,363,272	92.2	1,154,880	78.8	1,093,294	80.3	21,611,446	90.7	1,661,141	13.01
1st hlf.	38,727,306	92.7	2,279,520	78.2	2,173,397	80.3	43,180,223	91.1	1,669,123	25.87
1944										
Jan.	6,770,423	97.2	439,551	85.4	382,629	84.4	7,592,603	95.7	1,713,906	4.43
Feb.	6,410,914	98.5	409,781	85.2	373,314	88.1	7,194,009	97.0	1,737,683	4.14
Mar.	6,977,466	100.1	455,368	88.5	393,423	86.8	7,826,257	98.6	1,766,649	4.43
1st qtr.	20,158,803	98.6	1,304,700	86.4	1,149,366	86.4	22,612,869	97.1	1,739,451	13.00
Apr.	6,789,422	100.6	437,472	87.8	366,794	83.5	7,593,688	98.8	1,770,090	4.29
May	6,879,253	98.7	437,444	85.0	385,879	85.1	7,702,576	97.1	1,738,730	4.43
June	6,463,049	95.8	419,699	84.2	351,509	80.1	7,234,257	94.1	1,686,307	4.29
2nd qtr.	20,131,724	98.4	1,294,615	85.6	1,104,182	82.9	22,530,521	96.7	1,731,785	13.01
1st hlf.	40,290,527	98.5	2,599,315	86.0	2,253,548	84.7	45,143,390	96.9	1,735,617	26.01
July	6,743,812	96.6	415,543	80.9	339,032	74.6	7,498,387	94.3	1,696,468	4.42
Aug.	6,715,835	95.9	429,672	83.5	353,406	77.6	7,498,913	94.1	1,692,757	4.43
Sept.	6,501,944	96.1	398,058	80.1	335,109	76.2	7,235,111	94.0	1,690,446	4.28
3rd qtr.	19,961,591	96.2	1,243,273	81.5	1,027,547	76.2	22,232,411	94.1	1,693,253	13.13
9 mos.	60,252,118	97.7	3,842,588	84.5	3,281,095	81.8	67,375,801	96.0	1,721,405	39.14
Oct.	6,880,921	98.0	420,105	81.6	339,859	74.7	7,620,885	95.6	1,720,290	4.43
Nov.	6,572,454	97.0	403,908	81.0	302,357	68.6	7,278,719	94.3	1,696,671	4.29
Dec.	6,678,460	95.6	373,322	72.7	314,388	69.2	7,366,170	92.6	1,666,554	4.42
4th qtr.	20,111,835	96.9	1,197,335	78.4	956,604	70.8	22,265,774	94.2	1,694,503	13.14
2nd hlf.	40,073,426	96.5	2,440,608	80.0	1,984,151	73.5	44,498,185	94.2	1,693,878	26.27
Total	80,363,953	97.5	5,039,923	83.0	4,237,699	79.0	89,641,575	95.5	1,714,644	52.28

The percentages of capacity for 1944 are calculated on weekly capacities of 1,572,755 net tons open hearth, 116,182 net tons bessemer and 102,350 net tons electric ingots and steel for castings, total 1,791,287 net tons; based on annual capacities as of Jan. 1, 1944 as follows: Open hearth 82,223,610 net tons, bessemer 6,074,000 net tons, electric 5,350,880 net tons. Beginning July 1, 1944, the percentages of capacity operated are calculated on weekly capacities of 1,580,042 net tons open hearth, 116,182 net tons bessemer and 102,757 net tons electric ingots and steel for castings, total 1,798,981 net tons; based on annual capacities as follows: Open hearth 82,604,600 net tons, bessemer 6,074,000 net tons, electric 5,372,150 net tons.

For 1945 percentages are calculated on weekly capacities of 1,614,338 net tons of open hearth, 112,658 tons of bessemer and 104,640 tons of electric ingots and steel for castings, total 1,831,636 tons; based on annual capacities as of Jan. 1, 1945 as follows: Open hearth 84,171,590 net tons, bessemer 5,874,000 tons, electric 5,455,890 tons.

will require during the next four months about 350,000 tons of sheet and strip of the grades which are in short supply.

"During these four months, the steel industry will produce at present production rates about 2,400,000 tons of these gages. With 2000 additional men recruited for the sheet and strip mills, an additional 80,000 tons a month, or 320,000 tons for the four months, could be produced with present facilities—enough to take care of all reconversion."

Mr. Krug said all hot strip mills formerly rolling plates have been returned to full production of sheets, subject only to limitation on sheet finishing capacity and available manpower and those plate requirements which cannot be produced on other than strip mills due to requirements for extra deep drawing and pickling.

In announcing that WPB is throwing the full weight of its field and compliance forces into an investigation of the inventory and order position of large steel users, Mr. Krug said this will also make it possible to determine whether or not military cutbacks are being promtply reflected at the steel mills.

Reports are, said Mr. Krug, that in some instances orders on the steel mills for products that are in relatively easy supply have been changed recently to orders for products which are in short supply, such as sheets. WPB is investigating such cases both at the steel mill and plant levels, and promises appropriate compliance action will be taken when necessary.

The procurement services of the armed forces are in full agreement with this policy and have co-operated in its development, Mr. Krug said. Their procurement schedules, contractors' inventories, and the redistribution of any excess procurement requirements or inventories are to be geared to this program.

The procurement services, he said, are interested in keeping unemployment resulting from contract cutbacks or cancellations to a minimum and concur in the actions proposed by the WPB to improve the supply and distribution of sheet steel needed for reconversion. Army and Navy officers have been advised of the steps to be taken and they will assist WPB in accomplishing these results.

In addition to the above actions, Mr. Krug added, WPB is reviewing all third quarter allocations of steel, including export and lend-lease requirements and shipments. The objective, he said, is to reduce CMP allocations to the levels needed to protect only war and important war supporting activities for the one-front war. In a number of instances

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First Half Ingot Output Lowest Since 1942

Cold weather, floods, fuel shortage, labor interruptions cut production nearly two million tons from 1944 period

PRODUCTION of steel ingots and steel for castings during the first half of 1945 totaled 43,180,223 net tons, according to reports to the American Iron & Steel Institute. That tonnage was more than two-thirds of the total steel produced in the entire year 1929, the record peacetime production year, but was lower than the output of any half-year since the middle of 1942.

While March was the third highest on record from the standpoint of production, severe cold weather, floods, coal and labor shortages and other obstacles were encountered. On V-E Day operations were at about 95 per cent of capacity but in recent weeks rearrangement of war contracts and a series of sporadic labor disputes have depressed production.

Production for six months this year was 1,963,000 tons below the record of 45,143,390 tons made in first half of 1944. Operations averaged 91.1 per cent of capaicty for the first half of 1945.

June output was 6,868,717 tons, a drop of 582,086 tons from the 7,450,803 tons made in May. The industry operated at 87.4 per cent of capacity in June.

Steel Corp. Shipments 195,105 Tons Under May

Finished steel shipments by the United States Steel Corp. in June totaled 1,602,882 net tons, a decrease of 195,105 tons from May shipments of 1,797,987 tons and a decrease of 134,887 tons from deliveries of 1,737,769 tons in June, 1944.

For six months ended June 30 total shipments were 10,124,959 tons.

(Inter-company shipments not included)

	Net Tons			
	1945	1944	1943	1942
Jan.	1,569,115	1,730,787	1,658,992	1,738,898
Feb.	1,562,488	1,755,772	1,691,592	1,616,587
Mar.	1,869,642	1,874,795	1,772,397	1,780,938
Apr.	1,722,845	1,756,797	1,630,828	1,758,894
May	1,797,987	1,776,934	1,706,543	1,834,127
June	1,602,882	1,737,769	1,552,663	1,774,068
July	.....	1,754,525	1,660,762	1,765,749
Aug.	.....	1,743,485	1,704,289	1,788,660
Sept.	.....	1,733,602	1,664,577	1,703,570
Oct.	.....	1,774,969	1,794,968	1,787,501
Nov.	.....	1,743,753	1,660,594	1,665,545
Dec.	.....	1,767,600	1,719,624	1,849,636
Total	.....	21,150,788	20,244,830	21,064,187
Adjustment	.....	*98,609	*97,214	*449,020
Total	.....	21,052,179	20,147,616	20,615,137

*Decrease.

Big Metalworking Equipment Demand

Mechanical presses and allied machinery seen biggest equipment bottleneck in reconversion to civilian goods production. Industry is one of the few emerging from war without surplus capacity problems

MECHANICAL presses and allied sheet metalworking machinery are seen at Washington as the biggest equipment bottleneck facing manufacturers now seeking to reconvert from war to civilian production. The situation has improved greatly since the War Production Board in April began to give the AA-3 rating to equipment for which a vital need was shown. But even with such assistance a number of months will have to elapse before shipments can be made against new rated orders.

This is because current peacetime demands for such equipment are larger than the wartime demands. When industry was tooling up for war production, the dollar value of press orders averaged about 6 per cent of the dollar value of machine tool orders. Today, the dollar value of press orders is about 30 per cent of the dollar value of machine tool orders. The sheet metalworking equipment industry is one of the few emerging from the war without a surplus capacity problem.

The order backlog of press manufacturers at the end of May was $89,200,000 and May shipments were valued at $8,100,000; at that rate the backlog would take about 11 months to work off without allowing for new orders that continue to be placed on the books. New orders booked during May came to $9,200,000, or about $1,100,000 in excess of shipments during that month. Current demand continues to exceed shipments.

Rated Orders Account for Bulk

Unrated orders up to this time necessarily have received scant attention; of the May shipments of $8,177,000, rated orders came to $7,600,000 and unrated orders to $577,000. Of the $89,200,000 on the books as of May 31, rated orders came to $60,000,000 and unrated orders to $29,200,000. This ratio has been changed since, but not to an important extent, by reason of the changed status of Russian orders involving $6 million to $8 million. All these Russian orders have been unrated and many of them have been canceled or are due for cancellation.

Even so, the rated orders for presses and allied equipment at the end of May were sufficient to account for the output of the manufacturers practically through October. And rated orders represented a large proportion of the May bookings; of the $9,300,000 entered on books in that month, $5 million worth carried priority ratings. Because the war demand for presses has been about satisfied, nearly all the rated orders placed in May involved reconversion needs; the principal exception comprised some orders for shipment to France and Belgium which were given the AA-3 rating.

Outlook for increased production of presses and other sheet metalworking machinery is not regarded at Washington as bright. Plants making this machinery generally are located in important war production centers and, under current wage stabilization policies, are unable to offer wages that would entice many additional workers. Too, these companies continue to have trouble getting castings and forgings.

Supply of New Tools Improves

Supply of new machine tools is regarded as relatively more comfortable. At end of May the machine tool order backlog was $275 million, since reduced by some $60 million through cancellation of Russian orders. Shipments in May came to a shade under $40 million, so that the May 31 backlog was equivalent to about 5½ months' output at that rate. However, of the orders on hand at end of May, $93 million were unrated, and $120 million (not counting $60 million of Russian orders since canceled) were rated.

Of the $120 million rated total (not counting the Russian orders later canceled) about $90 million consisted of military requirements and $30 million covered reconversion bottleneck requirements. On this basis, the supply situation in connection with reconversion needs is regarded as not at all bad. Furthermore, demand is tending to ease; new machine tool orders in May came to $26,198,000.

In a few cases machine tool buyers would like a better rating than AA-3 for their reconversion tools. Such requests have been ruled out on the ground that higher ratings must continue to be reserved for war needs.

A few cases have come up lately where companies say they will need help in getting delivery of new conveying machinery for production of civilian goods. It is possible that in some of these cases the AA-3 rating may be allowed.

The situation surrounding demand for new tools, however, is only part of the story as many manufacturers are desirous of filling their reconversion needs in other ways. Automobile manufacturers, for instance, would like a release of thousands of their privately-owned tools now busy on war work so that they could be used for tooling up automobile production lines. These tools, they say, could be replaced in war work by government-owned tools. They say they know of large numbers of government-owned tools which are idle and thus available; yet the procurement agencies are reluctant to arrange such substitutions.

Among companies that plan to fill their

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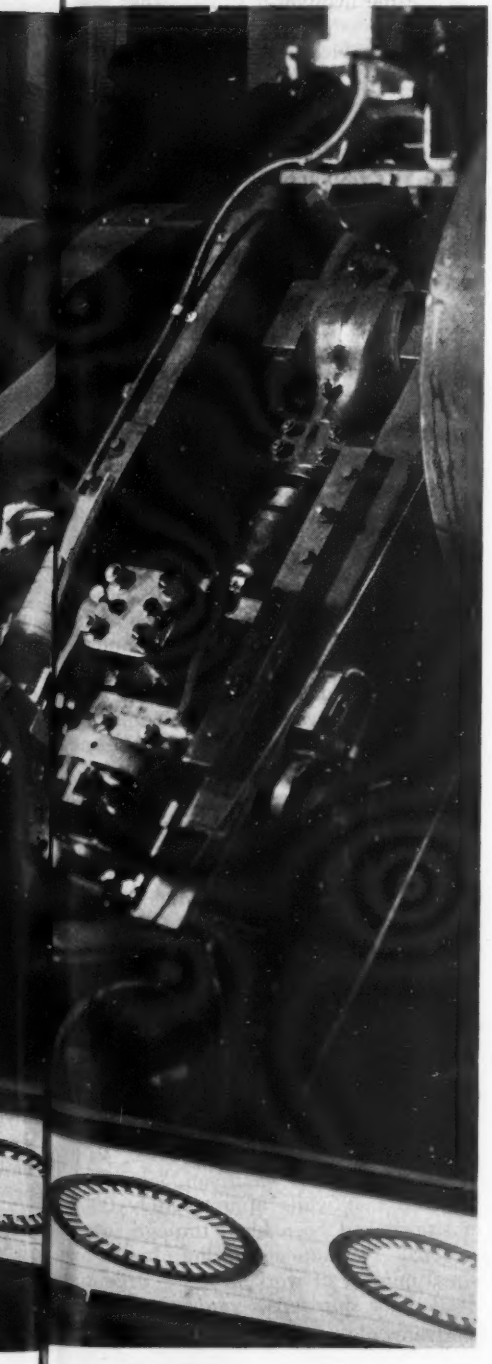
reconversion needs to a large extent by buying surplus tools from the government, there is considerable complaint to the effect that the procurement agencies are unduly slow in declaring idle tools surplus. Whether such complaints have any justification in fact cannot very well be judged from the outside, since the armed services may have further use for some of the tools that now are idle—and under the Surplus Property Act the services are not expected to declare tools surplus until they have lost their usefulness in war production.



Eventually large numbers of surplus tools will be available. The War Department reported recently that it owns 162,579 tools, of which 133,224 are standard general-purpose and 29,355 are special-purpose tools. The Navy owns 254,706 tools, of which 238,842 are standard general-purpose and 15,864 are special-purpose tools. The Army at present expects to retain about 40,000 and the Navy expects to retain about 100,000 of these tools. The remainder eventually will be designated as surplus and offered to industry.

In the meantime, declarations of surplus are slow as indicated by a check with the Reconstruction Finance Corp. disposal unit. The RFC has scarcely any standard general-purpose tools on hand anywhere in the country; demand for such equipment is active and all general-purpose machines are snapped up as fast as they become available.

In addition to surplus declarations being slow to date, they have involved chiefly older equipment up to this time. Few general-purpose tools built in the last five years so far have been declared surplus by the Army and Navy—and these newer tools comprise the bulk of the tools owned by these agencies.

Machinery Demand Active

A check with the War Department indicates that quite a few war contractors are taking an interest in acquiring, under Regulation 6 of the Surplus Property Board, government-owned machinery which they have in their plants. Based on reports from the various ordnance districts, sales under this regulation should come to $6 million to $7 million in July and should be equal to or larger than this total in the next few months. The War Department now has up for approval of the attorney general, under the provisions of the Surplus Property Act, four sales involving more than $1,000,000 each.

Surplus Property Board Member Robert A. Hurley, as the result of a recent study, estimates that about one-third of the government-owned machine tools qualify for sales under Regulation 6. The other two-thirds, he believes, will be more than enough to meet requirements of other potential buyers.

On the whole, currently available information is insufficient to warrant any definite estimate of the extent to which private industry will buy the surplus machine tools and other metalworking equipment which will become available in the course of time. Some of the automobile companies have reported that they will not want to buy more than 5 to 10 per cent of the government-owned machines in their plants. On the other hand, 28.3 per cent of the prospective buyers who responded to a questionnaire recently sent by STEEL to companies in the metalworking industries, stated that they propose to buy government-owned machines only in tooling up in the reconversion period.

Up to this time RFC officials in charge of disposal policies have seen no reason for departing from the Clayton formula in setting prices on machine tools. Indications to date are that prices set under the Clayton formula are regarded as satisfactory by the bulk of potential buyers. Demands for lower prices have come chiefly from dealers interested in rebuilding the tools and selling them with new-tool guarantees.

The RFC of late has been using the appraisal method of setting prices on equipment not covered by the Clayton formula. It appoints an appraisal board to set prices on the machines in question, and the prices recommended by the board are accepted as final. The RFC has abandoned the practice of selling machine tools and other machinery by auction sales. This method was found to yield prices which were too high in some cases and too low in others.

Although only a small fraction of the government-owned surplus equipment so far has become available, it already is clear that headaches will develop in connection with surplus special-purpose tools. The RFC regional offices now have listed some 17,000 special-purpose tools for which there are no takers. It seems only a matter of time when much of this special-purpose equipment will have to go to the scrap pile.

Production Quotas on Autos May Be Raised

Ceiling on passenger car production—now about 245,000 for the last half of this year and 450,000 in the first quarter of 1946—will be raised when more materials become available, Henry P. Nelson, automotive co-ordinator for the War Production Board, announced last week after a meeting with the Auto Industry Advisory Board.

Likelihood that rationing of new cars to essential drivers may be ended by next January was held out by the WPB.

Materials, including steel sheet and strip, textiles, bright plating materials, tires and some other essential items, are extremely scarce at present, but Mr. Nelson said "we expect the next 60 days to make a great change in the materials picture."

Possibility that the auto industry would be authorized to start a large expansion program this summer was also considered by the advisory committee and the WPB said that decision on the expansion would be reached soon. He asked the industry officials to submit estimated cost and location data of proposed new plants and branch factories, but warned that no priority assistance would be granted if approval is given.

Presses equipped with automatic feed and conveyors speed motor production at Westinghouse Electric Corp., Pittsburgh

Cutbacks Easing Manpower Supply; Displaced Men Being Reabsorbed

Only 53 labor areas remain in No. 1 critical shortage group. Further easing expected. Selective Service to tighten policies on occupationally-deferred men in 18-29 age bracket. May take key men in plants reconverting to civilian production

WAR production cutbacks are coming through on an increasing scale and indications point to a steady easing in the manpower situation over the remainder of the summer.

So far the unemployment slack occasioned by these order cancellations has been promptly taken up in most war production areas, in some of which labor shortages still are being experienced. However, indications are the number of Group 1 labor shortage areas will decline rapidly from now on.

The July report of the War Manpower Commission on the adequacy of labor supply, measured against demand, showed that of the 302 classified areas in the country, 53 remain in Group 1 compared with 66 a month ago. Expectations are the number will be still further reduced before the end of the summer.

While the labor supply generally will ease, many metalworking industries face the loss of key men in the younger age brackets to the armed services. Present plans of the Army and Navy are to call up 90,000 men a month and to reduce the number of occupational deferments in the 18-29 age group. When various agencies recently requested the continued deferment of 325,000 key men, Selective Service countered with a demand that the total be cut to 260,000 and announced it will limit deferments to that figure when it rescreens these requests early in August. The war agencies have been instructed to ask only for deferment of men engaged on war work. No needs in connection with the reconversion programs will be honored. No deferments will be made in plants whose war contracts have been terminated.

Ammunition Cut

Last week as a further readjustment of the Army's production program, the War Department announced cuts in the manufacture of miscellaneous ammunition items affecting 110 plants scattered throughout the country. These are in addition to cutbacks announced at Chicago within the past three weeks.

Following a one-day meeting at Cleveland it was announced that, out of the 110 plants, only 25 are involved to the extent of releasing 50 or more employes. It is estimated that not more than 3050 workers will be affected between now and Oct. 15 in plants of prime contractors. However, no estimate is available as to the total number of workers affected in plants of subcontractors.

Immediate steps are being taken by WMC to direct workers affected by the readjustments into other vital production jobs in their own areas.

Representatives of the Army, Navy, War Manpower Commission, War Production Board, Smaller War Plants Corp., and the Maritime Commission, sitting as the Production Readjustment Committee of the War Production Board, approved the readjustments prior to their announcement.

55,000 IDLE

More than 55,000 workers were idle throughout the country last week in strikes resulting from a wide variety of causes, many of which reflected the uneasiness of labor over prospects during the reconversion period. Some of the strikes were causing a loss of critical war materials and others were disrupting the flow of food and essential civilian services.

Two strikes at the South Works of Carnegie-Illinois Steel Corp. between June 30 and July 6 resulted in a loss of production of 23,000 tons of steel. The strikes brought to 202 the number of stoppages in Carnegie-Illinois plants in the Chicago district since Pearl Harbor.

It was pointed out that while 110 plants were affected in varying degrees by the readjustment only six received complete cancellation of their contracts. Large potential capacity for the manufacture of the affected items will be retained by most of the plants so that immediate full-scale manufacture may be resumed without delay to meet possible emergency needs in the future.

Following are plants where it is estimated 50 or more employes will be released between now and Oct. 15: Maddox Foundry, Archer, Fla., 50; Linderme Tube Co., Cleveland, 150; Cleveland Welding Co., Cleveland, 300; Lloyd Mfg. Co., Menominee, Mich., 80; Simmons Co., Elizabeth, N. J., 100; Chas. D. Briddell Inc., Crisfield, Md., 65; Revere Copper & Brass Co., Rome, N. Y., 125; Kingston Products, Kokomo, Ind., 175; Continental Die Casting Co., Detroit, 200; Kyle Corp., So. Milwaukee, 65; Kennedy-VanSauen Mfg. & Eng. Corp., Danville, Pa., 151; U. S. Machine Corp., Lebanon, Ind., 135; Columbia Electric Co., Spokane, Wash., 50; Electric Products Consolidated, Seattle, 120; Industrial Aircraft, Los Angeles, 50; Allen-Wales Adding Machine Corp., Ithaca, N. Y., 90; Kane Products Inc., Shelton, Conn., 50; Iron Fireman Co., Portland, Oreg., 60; Cavalier Corp., Chattanooga, Tenn., 50; Century Engineering Co., Cedar Rapids, Iowa, 140; Beam Mfg. Co., Webster City, Iowa, 80; Central Can Co., Chicago, 50; Associated Mfg. Co., Waterloo, Iowa, 100; Texas Steel Mfg. Co., Fort Worth, Tex., 150; Budd Wheel, Detroit, Mich., 50.

While the manpower situation has improved in certain areas of the Ohio-Michigan-Kentucky region during the last month, it is still serious in the region as a whole, there being a current shortage of more than 15,000 workers for the most urgently needed war supplies. In addition, 30,000 workers are needed by other essential industry.

Latest reports showed that the total employment of essential industry in the region was 1,864,000. This figure represents a net reduction of 54,000 from the preceding month, most of the reduction being reported in Michigan.

Ohio Situation Tight

Report of the most urgent, or "must," war production employers show a shortage of 15,000 workers compared with the peak "must" shortage of 19,000 during April. More than four-fifths of this shortage is reported by war plants in Ohio alone.

There was a sharp rise in the total number of new and continued unemployment compensation claims during the week ended June 16. This total was 52,000, compared with 35,000 four weeks earlier. The increase in claims was largest in Michigan.

During the past six weeks changes have been made in the classification of 10 labor market areas in the region. Lima, Mansfield, Toledo and Fostoria, O., as well as Pontiac, Mich., were changed from Group I to Group II areas; Detroit was changed from Group II to Group III and later to Group IV; Grand Rapids and Muskegon, Mich., changed from Group I to Group III; Zanesville, O., from Group II to Group III and Cincinnati from Group III to Group II.

On the Pacific Coast desperate need for ship repair workers continues. Paul V. McNutt, WMC chairman, last week reported that while approximately 6000 craftsmen had been hired through interregional recruitment during June, an equal number of workers still is urgently needed for ship repair yards.

Meanwhile, employment is reported

dropping in Los Angeles area war plants at a rate of more than 15,000 monthly, with some 8000 of the total women workers.

Layoffs in the aircraft industry jumped from 14 per 1000 in April to 51 in May, the Labor Department reported last week. The rate rose from 17 to 29 in the aircraft parts and engine industry.

Shortage of labor in steel plants continues to hamper production at various points. In the Youngstown district, for example, the manpower shortage is considered the top hazard to sustained mill operations. Some relief is being afforded mills in the district through the employment of schoolboy laborers over the summer.

At Birmingham the shortage of mill labor may force a serious curtailment in production by the Tennessee Coal, Iron & Railroad Co. More than 2000 additional workers are urgently needed in various departments. Robert Gregg, president, states 1330 men are needed immediately in the ore mines, 450 in manufacturing departments and 350 in coal mines. Part of the company's critical manpower situation is attributed by Mr. Gregg to absenteeism.

New U.S. Steel Conciliation Board Headed by Blumer

New Board of Conciliation and Arbitration for the five steel producing subsidiaries of the U. S. Steel Corp., created under and provided for by the March 13, 1945, labor agreement between the companies and the United Stetelworkers of America, is made up of Dr. Herbert Blumer, professor of sociology, University of Chicago, as public member; Gene Maurice, CIO official, as union representative; and Walter J. Kelly, manager of industrial relations, Tennessee Coal Iron & Railroad Co., as company member. The board will begin to function in Pittsburgh, where it has its headquarters, July 15 with Dr. Blumer as chairman.

Eaton Buys Government Plant at Massillon, O.

Negotiations have been completed for sale of an RFC-owned steel plant at Massillon, O., to the Eaton Mfg. Co., Cleveland. The plant will continue to be operated by the company in production of bullet core steel rods in the war program until its facilities are no longer needed for that or other war purposes, at which time it will be used for non-war production by the company. The purchase price is $291,302 cash.

The agreement providing for the disposal of the Massillon property, is the second to be announced by RFC this month. The earlier announcement covered the leasing of additional space in the government-owned Bustleton (Pa.) plant operated by the E. G. Budd Mfg. Co., Philadelphia.

Drive Launched To Cut Accident Rate in Structural Steel Field

FINAL plans for a concerted drive on production delaying accidents in the fabricated structural steel industry were drafted recently at a meeting of employer associations, labor organizations, and safety service agencies in the Department of Labor. The drive will officially open Aug. 1.

The industry ranked as the fifteenth most hazardous in the country, with an accident occurrence rate 75 per cent above the average for all manufacturing. In addition, the seriousness of the resultant injuries, as measured in days lost per thousand hours of work, was double the average. The 6700 injuries during that year cost the nation some four and a half million hours of production time, including estimated future losses resulting from deaths and permanent disabilities.

Management paid over a million dollars for compensation and medical expenses, and the addition of such indirect costs as damage to machinery, plant and equipment, and time lost by other workers, raised the total to some $5,500,000. The wage loss to injured workers totaled more than half a million dollars.

The Division of Labor Standards will direct the activities of its 600 volunteer safety agents, serving at a dollar-a-year under the war safety program, to safety in fabricated structural steel during the 5-month period—August through December, 1945. In addition, the division is preparing a series of printed pamphlets, one each for management, supervisors and workers, for distribution by its safety agents and members of co-operating agencies.

Co-operating in the drive are: The National Association of Miscellaneous Ornamental Iron Manufacturers, and the Concrete Reinforcing Steel Institute, representing management; the United Steelworkers of America (CIO) and the International Association of Bridge, Structural and Ornamental Iron Workers of America (AFL), representing labor and the following safety and service agencies: American Mutual Alliance, American Red Cross, American Standards Association, Chamber of Commerce of the United States, Industrial Safety Equipment Association, National Bureau of Standards, National Conservation Bureau, National Fire Protection Association, National Safety Council, Department of Commerce, and Public Health Service.

TRANSITION TOPICS

RAILROADS— Accelerating traffic movement to the West, combined with increase in civilian goods shipments accompanying reconversion, imposes heavy burden on carriers. Necessitates efficient use of equipment, less delay in loading and unloading, and restrictions on less essential traffic. See page 83.

SHEET SUPPLY— Shortage of sheet and steel strip looms as serious obstacle to early reconversion. War Production Board moves to spread available supplies as far as possible. See page 86.

MACHINERY— Mechanical presses and allied sheet metalworking equipment backlogs are heavy and deliveries far extended, threatening equipment bottleneck in reconversion plans. See page 88.

LABOR— Manpower supply becoming easier as munitions cutbacks increase. Strikes continue to keep many plants idle. Selective Service tightening policy on occupational deferments for men in 18-29 age bracket. See page 90.

TAXES— Government fiscal policy viewed by secretary-designate of treasury as means for regulating national economy. See page 92.

AUTOMOBILES— Passenger car quotas may be increased. End of rationing of new cars seen possible by beginning of 1946. Ford hopes to sample all dealers by Labor Day. See pages 89, 99.

WESTERN STEEL PLANTS— Commerce Department recommends war-born plants be leased to small companies for as long as 20 years. Action would require new legislation as present surplus property law limits leases to five years. See page 105.

Vinson Sees Tax Law Changes as Aids to Reconversion, Employment

Secretary of treasury-designate believes government's fiscal policy can be used to regulate economy. Would appraise each type of tax and each type of expenditure in terms of national economic consequences

ANNOUNCEMENT of the forthcoming appointment of Fred M. Vinson, now director of the Office of War Mobilization and Reconversion, to be secretary of the treasury has focused attention on Mr. Vinson's views of postwar taxation and fiscal policy. These were set forth in his recent report to Congress and the President in which he called for modernization of the tax structure as "the foundation of our entire program to reach and maintain full employment after the war."

After the war, government revenue needs will be three times what they have ever been in peacetime, Mr. Vinson predicts.

"The federal tax structure will, therefore, be a far greater factor in the economic health and stability of our nation than ever before. I believe the following principles should guide us in constructing our tax program:

"1. Taxes should be levied in such a way that they have the least harmful effect on the expansion of business investment and the creation of jobs, because productive employment is the source of our standard of living, of all income, and of the revenue which the government collects from taxes.

"2. Taxes should be levied in such a way that they have the least harmful effect on the maintenance of mass markets and mass purchasing power because that is the basis of business, labor, and agricultural prosperity.

"3. Taxes must be fair among people.

"4. Tax policy should be integrated with a fiscal policy designed to prevent inflation and deflation."

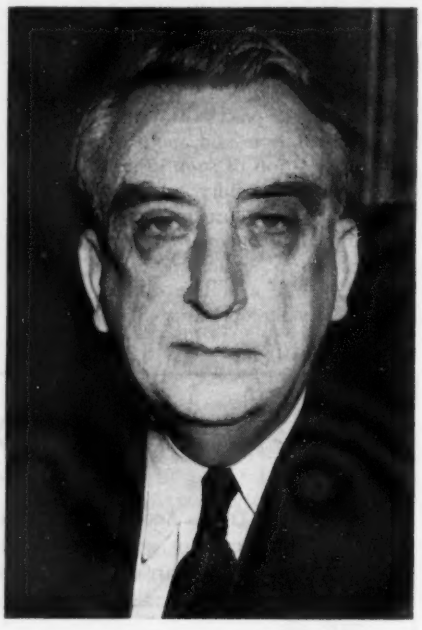
Broad Income Tax Base

Acceptance of these principles, according to the secretary-designate, means that the personal income tax must be the chief source of revenue and the base must be broad. He believes that sales and excise taxes should be eliminated as far as possible, as they place a hidden tax burden on those with low incomes and also restrict markets for business.

Excess profits tax, says Mr. Vinson, should be repealed after V-J Day. Taxes on business earnings should be modified, bearing in mind, on the one hand, the revenue needs of the government and, on the other hand, the incentive for risk-taking and expansion to be gained by the modification.

Mr. Vinson's statement indicates a desire for passage of a postwar tax bill as early as possible. "The sooner uncertainties in postwar tax structure are removed the sooner business management will be inclined to make firm commitments for expansion and the faster men can be put back to work following the wholesale cancellation of contracts that will occur with the unconditional surrender of Japan."

Steps toward revising the tax laws already have been taken by the House which recently approved and sent to the Senate a bill designed to speed reconversion. The bill chiefly will aid small business firms. Specifically the bill provides:



FRED M. VINSON

1. Increase in the excess profits tax specific exemption from $10,000 to $25,000, effective with the beginning of the 1946 tax year. Tax experts estimate this will reduce excess profit obligations in 1946 by $160 million.

2. The postwar credit of 10 per cent of the 95 per cent excess profits tax be taken currently with respect to tax liability of 1944 and subsequent years, reducing tax payments in 1945 on 1944 liabilities by about $830 million and in 1946 with respect to 1945 liabilities by about $710 million.

3. Advance to Jan. 1, 1946, the maturity date of outstanding excess profits tax postwar refund bonds, hastening the availablity of $1.3 billion that otherwise would be paid from two to four years after the end of the war.

4. Speed up refunds resulting from carrybacks of net operating losses and of unused excess profits credits. Under the present law these refunds, amounting to $1 billion, would be paid over an indefinite period from 1947 to 1950.

5. Hasten refunds resulting from the recomputation of deductions for amortization of emergency facilities, affecting perhaps $1.7 billion otherwise to be refunded over an indefinite period.

The tax bill passed by the House is intended as an interim measure and on the whole is estimated to improve the cash position of business by $5.5 billion.

While most business observers found some encouragement in his expressions on modernization of the tax structure, there were numerous raised eyebrows over his theory that the government's fiscal policy should be used to turn on or off the spigot of private expenditures by increasing or reducing public spending.

Outlining the fiscal policy, he says:

"The postwar federal budget will be large. It is reasonable to expect that the government will be spending, on the average, about $25 billion a year, about three times the prewar budget. Tax receipts will be far larger than ever before. The legacy of the war—in debt, obligations to veterans, and maintenance needs of the armed forces—accounts for most of the increase. Also, we shall want to enjoy some of our increased national income in the form of increased public services.

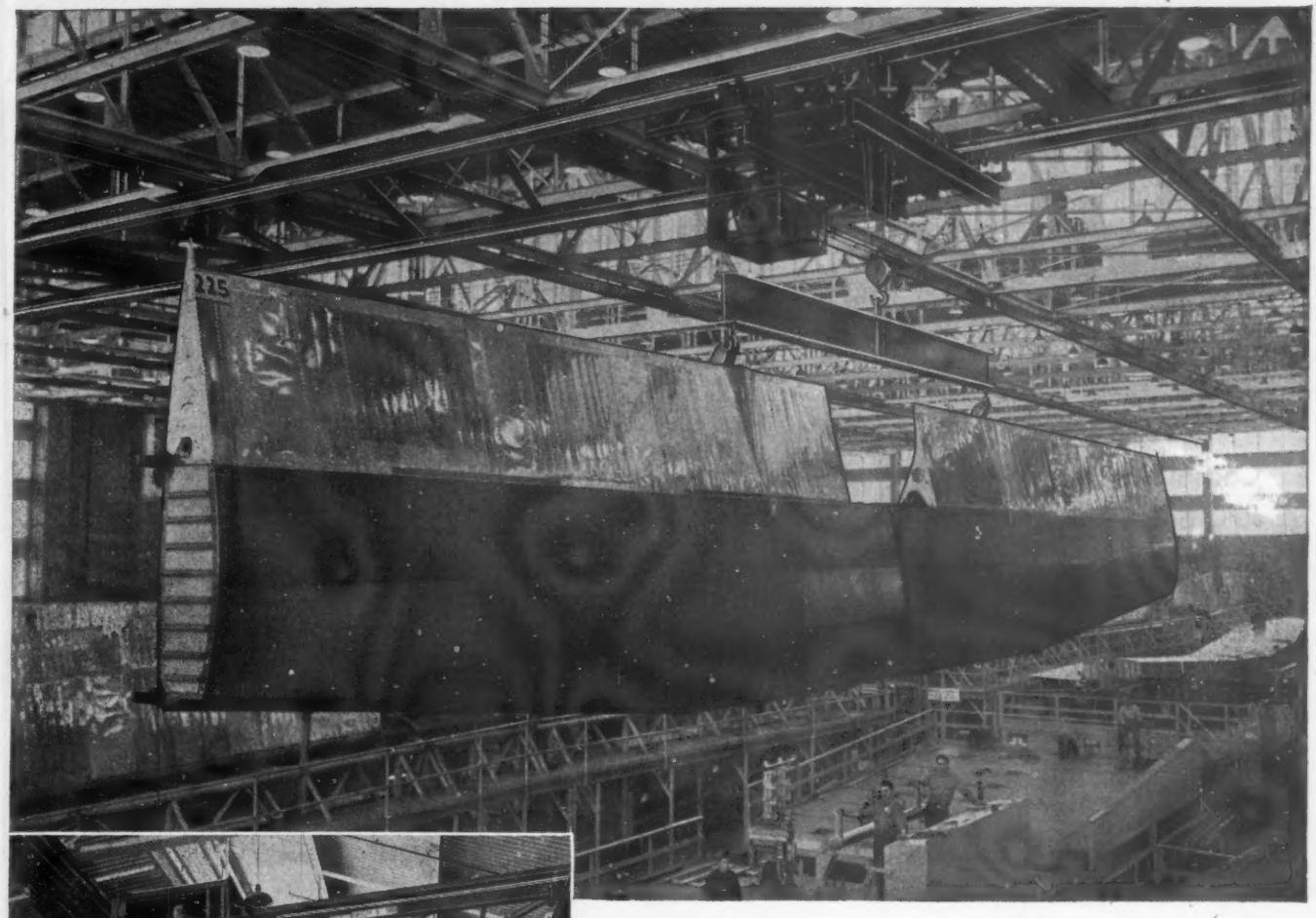
Budget Must Be Managed

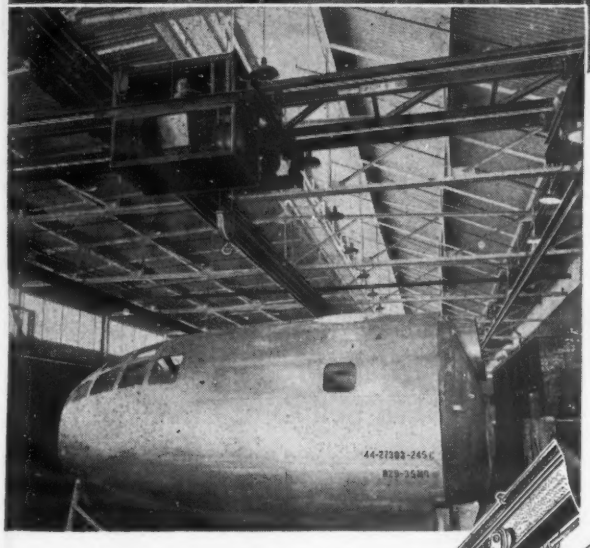
"The management of a budget of this size will have a tremendous influence on the level and stability of the whole economy. Whether or not to manage the budget is no issue. It must be managed. But a budget which is entirely the result of unco-ordinated consideration of particular projects and policies can have perverse effects upon the economy as a whole.

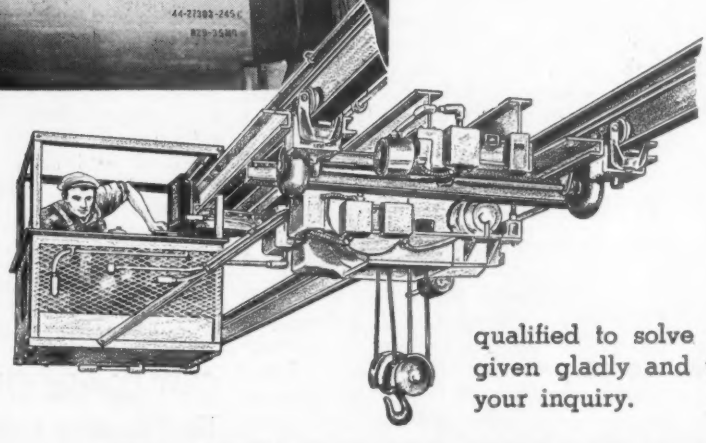
"We need to consider and formulate a total budget in relation to the total economic situation. A fiscal policy developed on this basis can stimulate private expenditures either by reducing taxes or increasing public spending whenever private spending appears inadequate to sustain full employment. It can raise taxes or reduce government spending whenever the level of private spending threatens inflation. Further, each type of tax and expenditure must be appraised in terms of economic consequences.

"On the expenditure side of the budget the item most susceptible to flexible planning is public works. Expenditures for most other government functions cannot be varied greatly. But both the aggregate volume of useful public works over long periods and the year-to-year timing may be adjusted over a considerable range without sacrifice of efficiency or utility.

"Appropriate use of budgetary policy







Top
Long-span cranes operate over multiple crane rails and run the entire length of the building.

Bottom
Two short-span cranes inter-locked as a single unit. Carrier can operate each crane individually or both as a single unit.

AMERICAN MONORAIL CRANE

Handles large center section of B-29 Wing

The above photograph shows a six ton center wing section of a B-29 being lifted 25 feet in the air and covering a distance of 85 yards — completely handled by crane cab operator.

This is another example of the overall application of American MonoRail cranes. This long span crane in many respects resembles an overhead railway system, all movement being controlled by the operator in the cab.

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for economic stabilization will require improvement of existing techniques for fiscal planning. The administration must be prepared to submit a government budget framed and analyzed in relation to the total national budget; the Congress must be equipped to consider and, if necessary, revise the budget on same basis. The Full Employment Bill, which I have endorsed in principle, establishes a mechanism for discharging this necessary function of government—budgetary planning—in a way which will help fulfill the necessary responsibility of government, full employment."

Consolidation of Various RFC Subsidiaries Effected

Signing of the Reconstruction Finance Corp. "merger law" by President Truman is described by Federal Loan Administrator John W. Snyder as an important step toward simplification of RFC.

Consolidation of certain subsidiaries into RFC itself became effective July 1. It provides for the absorption by RFC of the following subsidiaries: Rubber Reserve Co., Metals Reserve Co., Defense Plant Corp., Defense Supplies Corp., Disaster Loan Corp.

These RFC subsidiaries were, with the exception of Disaster Loan Corp., created for purpose of national defense and war production.

"Consolidation of the subsidiaries into RFC, the parent corporation, in addition to simplifying operations may reasonably be expected to result in some economy," Mr. Snyder said.

"The management of their activities will remain in the board of directors of RFC, the members of which have previously served as the directors of the subsidiary corporations.

"All outstanding contracts of the subsidiary units and all new contracts which may be necessary will be administered by substantially the same personnel as at the present time, although this personnel henceforth will be acting directly for RFC instead or acting for the subsidiaries. Thus, there will be no interference in the flow of strategic materials and other critical supplies and equipment essential to the successful prosecution of the war against Japan."

Authorization at the beginning of this year by the subsidiary corporations, together with RFC direct commitments for war purposes of approximately $2.6 billion, have amounted in round numbers to $32 billion. Disbursements have been in excess of $18 billion. Repayments of loans and advances, collection of rentals and part payments on plants and equipment, and proceeds of sales of materials, etc., have been approximately $9 billion. The disbursement figure includes $1.4 billion for direct subsidy payments, under section 2 (e) of the Emergency Price Control Act of 1942, as amended, to increase or maintain production of materials defined by the President to be strategic or critical. However, this latter figure does not include losses arising from the purchase and sale of such materials.

CONGRATULATIONS: Secretary of State James F. Byrnes receives the congratulations of President Truman after being sworn into office. Left to right: Edward R. Stettinius, Mr. Byrnes' predecessor; Sen. Kenneth McKellar, president pro tem of the Senate; Secretary of War Henry L. Stimson; Mr. Byrnes; Robert Hannegan, postmaster general; and President Truman. NEA photo

Merchant Pipe Resale Prices Revised by OPA

Resellers of pipe who furnish threaded and coupled line pipe 8 inches and larger to fill orders for merchant pipe may charge the higher line pipe selling prices, Office of Price Administration ruled recently. The line pipe price, which is higher than the price of merchant pipe, may not be charged, however, unless the pipe offered for sale meets the line pipe specifications.

WPB Approves 1120 Projects For Industrial Reconversion

War Production Board has approved 1120 new applications for preferential ratings for construction and equipment materials necessary for industrial reconversion, totaling $199,524,000. These were granted from April 1 through June 29 under Priorities Regulation 24 and Direction 5 to order L-41.

As of June 29, iron and steel product industry had 257 applications approved to the total value of $30,319,000, of which amount $11,825,000 was for construction and $18,494,000 for equipment. Automobile and equipment industry had 257 approved applications amounting to $128,765,000, of which amount $34,588,000 was for construction and $94,177,000 for equipment. Machinery (other than electrical) industry ranked third with 231 approved applications at a total value of $25,309,000, of which amount $7,841,000 was for construction and $17,468,000 for equipment.

Alien Property Custodian To Sell Ore, Chemical Firm

Office of Alien Property Custodian has invited sealed bids for the purchase of all the outstanding stock of Ore & Chemical Corp., New York, and for 3.89 per cent of the capital stock of Pembroke Chemical Corp., Pembroke, Fla. Bids will be received until noon, Aug. 10. Ore & Chemical Corp. is engaged in the importation and exportation of chemicals, pharmaceuticals and drugs, and in the operation of a mill in Colorado for the concentration of nonferrous metal ores. Pembroke owns and exploits phosphate bearing lands in Florida.

ODT District Officials To Allocate Light Trucks

Effective Aug. 1, district managers of the Office of Defense Transportation will have full authority to allocate light and medium trucks and to issue certificates of transfer without forwarding requests to the ODT allocation section in Washington for approval, as is done now.

Federal Statute of Limitations Urged by Manufacturers' Group

Constantly changing rulings and interpretations by administrative bodies and courts increase danger of retroactive liabilities under federal laws. War emergency has complicated picture and increased need for corrective action

NEED for a uniform federal statute of limitations to protect business and industry from heavy penalties and damages which now may be made retroactive over long periods was stressed before House Judiciary subcommittee recently by Raymond S. Smethurst, counsel for the National Association of Manufacturers.

Mr. Smethurst testified before the committee in hearings on H. R. 2788, introduced by John W. Gwynne (Rep., Iowa), which would limit the time in which private actions based on federal law could be instituted to one year and the time in which public action could be brought to two years.

This bill, or some modification of it, has been widely endorsed by business and industry. If enacted it would materially reduce payments exacted from business enterprises under the "liquidated damages" principle under which the courts customarily award double the amount of the damages plus attorney's fees.

The bill is intended particularly to protect employers from excessive damages assessed under the Fair Labor Standards Act of 1938 although it also would apply to many other recent federal acts.

Would Affect 17 Federal Laws

According to Representative Gwynne 17 different federal laws would be affected by such a statute of limitations because these laws grant public or private rights of action but do not contain any period of limitation within which the action must be brought.

Among the more important laws affected would be the Sherman Antitrust Act, the Webb Export Act, the Federal Trade Commission Act, the Securities Exchange Act of 1934, the Fair Labor Standards Act of 1938, the Public Contracts Act of 1936 and the Surplus Property Act.

The multitude of federal laws and the ever-changing interpretations and regulations issued under these laws have made it impossible for many businesses, especially small companies, to keep abreast of them. Consequently, unwitting violations are common and any of these may create a liability for damages.

Mr. Smethurst summarizes the views of the manufacturers' association as follows:

Many of the regulatory laws of the past decade permit assessment of heavy penalties upon business and industry. Time and again these liabilities attach retroactively to conduct which was lawful at the time, but which is later made unlawful by constantly changing rulings and interpretations of administrative bodies and the courts.

Corrective legislation is vitally needed, especially for small units in business and industry who do not have the financial resources to withstand such heavy and unanticipated liability. This is particularly true as we emerge from the war, during which many of these potential liabilities have increased in direct proportion to the high level of wartime employment and the pressure exerted to "get the job done."

H. R. 2788 offers a partial corrective by providing that these heavy penalties cannot continue to accrue indefinitely. The bill does not meet the equally serious need for reducing liabilities which may already have accrued under recent administrative rulings and judicial decisions.

It is recommended therefore that the bill be amended: To include actions for penalties or wage adjustment not now clearly covered; to reduce the period within which such private or public actions must be brought; to provide the same treatment for actions which have already accrued, in whole or in part, as is provided for future claims or actions.

If the committee decides, for reasons of law or policy, that a reasonable time should be allowed for filing of accrued actions, we urge that such period should not exceed 90 days, and as to such actions, that a maximum period of recovery be provided not to exceed a period of one year prior to the effective date of the limiting statute.

Industry is now facing a difficult period of reconversion. Uncertainty in the laws, with unknown and retroactive penalties for unintentional violations, can seriously jeopardize and impair business assets so vitally needed to plan and prepare for peacetime production and jobs. Enactment of a limiting statute could provide an important and needed stimulant to postwar business venture and risk-taking.

Steel Requirements for Construction in 1945 Gain

Quantities of construction materials required in 1945, as estimated by the War Production Board, and actual consumption in 1944, respectively, are in part as follows in short tons: Cast iron, 384,000 and 392,400; steel, 2,692,000 and 2,067,000; steel plate, 341,000 and 285,600; copper, 28,285 and 29,616; lead, 32,538 and 37,784; zinc, 8934 and 10,370.

NEW UNDER SECRETARY: Artemus L. Gates, former assistant secretary of navy, is sworn in as under secretary by Rear Adm. T. L. Gatch. Watching are Fleet Admiral E. J. King, second from left, Mrs. Gates, and Secretary of Navy James V. Forrestal, right. NEA photo

PRIORITIES–ALLOCATIONS–PRICES

Summaries of revocations of and amendments to orders and regulations; official interpretations and directives, issued by War Production Board and Office of Price Administration

REVOCATIONS

ELECTRIC IRONS: Order L-65-a, which controlled production of electric irons, has been revoked. WPB will continue to give priorities assistance for production in the third quarter on the same level as in the first and second quarters, providing for the manufacture of about 500 000 irons in the quarter. Production above that amount must be achieved without priorities assistance. (L-65-a)

TIRE CHAINS: Order L-201, which limited types, sizes and amounts of automotive tire chains, tractor tire chains, and chain parts, has been revoked. (L-201)

FARM MACHINERY: Orders L-257 and L-257-a, which controlled production of farm machinery and equipment, have been revoked. (L-257, 257-a)

TOOL STEEL: Order M-21-j, which limited the purchase of tools with a high tungsten content, has been revoked. (M-21-j)

DIAMOND DIES: Order M-181, which controlled allocation of diamond dies, has been revoked. (M-181)

MILK CANS: Order M-200, which restricted manufacture of fluid milk shipping containers and covers by specifications and steel content, has been revoked. (M-200)

AMENDMENTS

CONTROLLED MATERIALS: A steel producer will not have to defer an unrated order or a "Z" order on his production schedule in favor of a regular authorized controlled material order after expiration of the "lead time," unless specifically directed to do so by WPB. The lead time for steel, under CMP No. 1 as amended, in the several listed controlled materials forms and shapes have been shortened to 30 days, except for the lead times on cold-drawn tubing and wire rope, which have been shortened to 60 days.

Reference to a reseller of controlled materials has been eliminated from direction 48 to CMP regulation 1. The amended direction now refers only to purchases or sales of controlled materials by an intermediary.

Procedures to be followed by copper wire mill warehouses in replacing, establishing and increasing stocks have been set forth in direction 4 to CMP regulation 4. Copper wire mill warehouses are no longer required to file form 3009, except when specifically instructed to do so by WPB.

The rating AA-1 may now be used to obtain maintenance, repair and operating supplies by textile machinery producers. This was provided in amendment 5 to CMP regulation 5. (CMP Nos. 1, 4, 5)

HAND SERVICE TOOLS: Restrictions on production and delivery of mechanics' hand service tools have been relaxed. List of tools covered by the order has been reduced and now includes, in exhibit A: Metal cutting snips and shears, slip and solid joint pliers, all types of screw drivers, and the following wrenches: Adjustable auto, adjustable 22½-degree angle, box, monkey, open and combination box, pipe, socket and driving units.

Ball pein hammers, cold chisels and punches, metal cutting files, metal working punches, piston compressors, ring groove cleaning tools, spring testers, tool boxes and valve spring compressors have been removed from the list.

The AA-5 rating floor at the producers level for the industry has been removed. Effective Aug. 1, form WPB 547 (distributors' stock set-aside) has been eliminated. After that date, producers will be permitted to schedule up to 25 per cent of total monthly production of each item listed on exhibit A for delivery on unrated orders, even though they may have unfilled rated orders for these types of tools. A producer who does not have enough rated orders to take up 75 per cent of his total monthly production in any month may deliver more than 25 per cent on unrated orders. Deliveries of unrated orders in excess of 25 per cent, however, may be made only in accordance with PR-1, which requires that rated orders be filled first.

On Aug. 1, all ratings assigned on form WPB-547 or Canadian form PB-1010 for items on exhibit A will be canceled and ratings will no longer be assigned on these forms. Outstanding ratings for export are also canceled on that date except where the tools are procured by a United States government agency.

Restrictions on the use of alloy steel and the 60-day inventory limitation on mechanics' hand service tools have been eliminated from the order. (E-6)

FURNITURE: Restrictions on the use of metal, except steel, in the production of furniture and fixtures have been removed. Exemption from steel usage restrictions is granted producers making or assembling not more than $50,000 worth of furniture or fixtures (manufacturer's sales prices) a quarter (in addition to the exemptions formerly granted). Manufacturers who are subject to L-13-b and who were granted spot authorization under PR-25 before July 4, 1945, have a choice between manufacturing up to the amount of the authorization, or manufacturing up to the $50,000-a-quarter exemption permitted on furniture containing steel in amended L-13-b. They cannot do both. Manufacturers may apply for permission under PR-25 to use steel in additional amounts beyond those permitted under the $50,000 limit. (L-13-b)

WATER HEATERS: Water heaters subject to provisions of the order controlling the distribution of plumbing, heating and cooking facilities have been redefined to exclude types formerly covered by order L-123, which was revoked recently. Water heaters as now defined are direct fired and indirect types. The definition excludes indirect water heaters having a coil or nest of tubes installed in a shell or press vessel with a diameter larger than 12 inches. It also excludes industrial and direct hand-fired solid fuel hot water heaters of specified types. (L-79)

POWER SWITCHING EQUIPMENT: Most of the wartime specifications covering manufacture of power switching equipment have been revoked. Specifications in schedule IV of the order covering metal-clad switchgear and oil circuit breakers are retained. (L-154)

ELECTRIC FANS: Unrestricted production of electric fans without priorities assistance for the acquisition of materials, as well as limited production with priorities assistance, is now permitted. Restrictions on distribution of new fans remain in effect and apply to all electric fans, whether made with or without priorities assistance. The previously approved quarterly programs for the production of 25,000 electric fans will remain in effect in the third quarter. Production of fans in excess of this amount is permitted to the extent that materials are available without priorities assistance. (L-176)

FARM MACHINERY: Farmers now may apply for preference ratings on form WPB-541 for assistance to replace and repainr farm machinery and equipmnt destroyed or damaged by floods, wind storms or lightning in 1944 and 1945. The form must be filed with the county committee of the AAA. Order L-257-c also assigns priority to orders for hames, allocating materials and facilities for the production of this item. Producers of hames must manufacture and fill as many orders during each of the third and fourth quarters of 1945 as they produced during the second quarter. (L-257-c)

FURNITURE: Restrictions on the use of upholstery springs in the manufacture of furniture have been removed. Exemption for small manufacturers has been raised to $50,000 worth of production a quarter. (L-260-a)

ELECTRONIC EQUIPMENT: No producer now may manufacture any electronic equipment except (1) to fill preferred orders, (2) to fill authorized production schedule as defined in CMP regulation 1, or (3) production specifically authorized by WPB under PR-25. (L-265)

AUTOMOTIVE MAINTENANCE EQUIPMENT: All controls on production and distribution of automotive maintenance equipment have been removed.. Preference ratings and firm allotments assigned for maintenance equipment may be used only for the production of items on list B. Schedule A items will be produced in the future without priorities assistance. Schedules B and C have been combined into one schedule, designated schedule B, since WPB considers it is no longer necessary to keep these items separated. (L-270)

TIRE CHAINS: Amendment of L-302 incorporates, in a new table 6, the tire chain implication provisions formerly contained in order L-201. Allocation of production between PD-1X and other orders for chain is no longer required. (L-302)

STEEL: Direction 3 to order M-21-b-1 and direction 3 to M-21-b-2 have been revoked. The first direction provided a plan to build up steel warehouse inventories on a deferred order basis by use of a "ZW" symbol. The second direction exempted distributors of oil country goods from provisions of the order that required that warehouses starting in operation after April 1, 1944, could only purchase initial steel inventories from holders of idle and excess stock. Warehouses, along with all other consumers, now are allowed to place unrated orders. (M-21-b-1, M-21-b-2)

CANS: For packing paste water paints, including resin emulsions, manufacturers now may use 100 per cent of their 1941 usage of tin plate or terne plate cans, instead of 60 per cent as formerly allowed. (M-81)

COLLAPSIBLE TUBES: Each producer of collapsible tubes in the third quarter, may use 20 per cent as much lead as he used in the entire year of 1944. This amount of lead (80 per cent of 1944 usage in a similar period) must cover all production, both military and civilian. Unrated orders for delivery of products directly or indirectly to the Army, Navy, WSA, Maritime Commission, Veterans Administration, Red Cross, OSRD, and the Panama Canal (including Panama Railroad) must be accepted and treated as if they were rated AA-5, if certified in accordance with terms of order M-115. Tube manufacturers must make at least 25 per cent as many tubes for packing medicinal products as they made during the whole of 1944. (M-115)

SCHEDULED PRODUCTS: Generators driven by steam turbines, hydraulic turbines and diesel engines, soot blowers, watthour meters and integrating electrical meters have been removed from table 8 of order M-293 and are no longer subject to future scheduling controls. All other "X" items listed in Table 8, except oil and air circuit breakers and metal-clad switchgear, are reduced to "undesignated" items. Purchasers of boilers no longer are required to obtain WPB approval before placing their orders with the boiler manufacturers.

Other items on which scheduling controls have been relaxed are: Components for internal combustion engines built by the engine manufacturer for incorporation in his own end product; diesel or natural gas driven generators, and hydraulic governors, except aircraft; various types of chemicals processing equipment; cranes

and monorail systems; industrial type transformers, reactors and chokes, except for orders for this equipment placed with General Electric Co. at Fort Wayne, Ind. Such transformers now may be purchased from manufacturers without first filing for approval and a fixed shipping schedule on form WPB-1682. (M-293)

TIN PLATE SCRAP: All manufacturers who use the contents of tin cans in their manufacturing operations must adopt tin can salvage measures. The used tin cans must be properly prepared for salvage and delivered to the local salvage collection authorities or designated tin scrap collection dealers. (M-325)

PRIORITIES REGULATIONS

PREFERENCE RATINGS: Welded coil chain sizes $\frac{7}{16}$-inch and under, bicycles and metal bathtubs have been added to list B of PR-3, which invalidates all blanket MRO ratings for all items listed. The category "blowers and industrial vacuum cleaners" has been changed to "blowers, portable electric hand and industrial cleaners," and the definition of scales has been broadened to include all scales and balances.

Sterilizer equipment and an order reference as it applied to track laying tractor repair parts have been eliminated from list A (items that may be delivered without regard to any WPB ratings). (PR-3)

SPECIAL SALES: Most special sales now made be made freely without WPB authorization and without requiring the buyer to apply or extend a preference rating. The only exceptions to the relaxation of the rule are "special sales" of materials or products on list A (domestic sales) and on list B (export) and certain other sales as scrap.

Diamond dies, electrical resistance material, fractional horsepower motors, industrial power trucks and all except 20 of 55 restricted types of radio and radar tubes have been deleted from lists A and B, as was complete electronic equipment (excluding all test material) manufactured on or before April 24, 1943, which is considered unlisted and may be sold freely. Other deletions from list A were babbit and solder. Containerboard has been added to list A (PR-13)

CIVILIAN PRODUCTION MATERIALS: Policies in accordance with which limited priorities assistance may be granted for civilian production materials in the United States and Canada during the third and fourth quarter of 1945 are set forth in a new regulation, Priorities regulation No. 28. The regulation also lists a number of special instances in which individual aid may be granted certain manufacturers. (PR-28)

PRICE REGULATIONS

BALING WIRE: Maximum pricing formulae for coiled hay baling wire established in order 18 of price schedule No. 49 are based upon those established for single loop bale ties. At the wholesale level, they permit a markup of 20 per cent over the permissible cost and at retail level an additional markup of 33 1/3 per cent of the permissible cost from a wholesaler. (No. 49)

NONFERROUS FOUNDRY PRODUCTS: A new alternative method of determining foundry dollar-and-cent ceiling prices for aluminum and magnesium airframe sand castings has been established. Producers may add extras and premiums to determine fob maximum prices for castings of various sizes and intricacy. Foundries, if they so desire, may continue to use their present "freeze" prices, which generally are the highest prices they charged during Oct. 1-15, 1941, less the required reduction of 3 cents per pound. Present "freeze" prices are, in effect, flat prices ranging from $1.07 to $1.12 per pound for most sellers for aluminum airframe sand castings, regardless of size, number of cores, intricacy or cost involved, and $2.17 to $2.27 a pound for magnesium castings. (No. 125)

Two-Year Average Munitions Production Exceeds $5 Billion per Month, Says Krug

SINCE the summer of 1943, the United States has produced more than $5 billion worth of munitions each month, J. A. Krug, chairman, War Production Board, said in his report to the President on "War Production in 1944."

In that year, the most productive in history, the country produced 96,359 planes (including 16,048 bombers), built 30,889 ships, 17,565 tanks, 595,330 Army trucks, and produced 3284 heavy field guns and howitzers, and 7454 light ones, 152,000 Army aircraft rocket launchers, 215,177 bazookas, 1,416,774 tons of ground artillery ammunition.

Mr. Krug reported that under the Controlled Materials Plan in 1944 direct military and export requirements absorbed 92 per cent of the aluminum, 81 per cent of the alloy steel, 65 per cent of the carbon steel, 90 per cent of the brass mill products, 69 per cent of the wire mill products, and 71 per cent of foundry copper and copper-base alloy products. He emphasized that these figures, dramatic though they are, underrate the extent to which controlled materials have gone to war and stayed in war, for much of the material allotted in the first instance to domestic requirements was actually for indirect military and other war-supporting purposes.

In addition to supplying the best equipment in the world to the largest navy, the largest air force and one of the largest armies in the world, the nation has maintained its civilian economy in a healthy condition, he said. The American consumer was furnished in 1944 with more goods and services than in any year since 1941.

Through the "spot authorization" plan, WPB established a sound basis for shifting to civilian production those plants whose military contracts were cut back, and for keeping the plants, with their labor forces, in stand-by condition, ready to switch back rapidly to meet new demands of the military.

Mr. Krug's report called attention to many outstanding wartime production achievements in the materials field; among them, the 33 1/3 per cent increase in steel production between 1940 and 1944; the trebling of aluminum output between January, 1942, and October, 1944; the rise of magnesium production to 50 times the 1939 output; the 75 per cent increase in generation of electric power between 1939 and 1944; and rise of synthetic rubber output from 8000 tons in 1941 to 753,000 in 1944.

OPA Pricing Activities for All Metals Centered in New Metals Price Branch

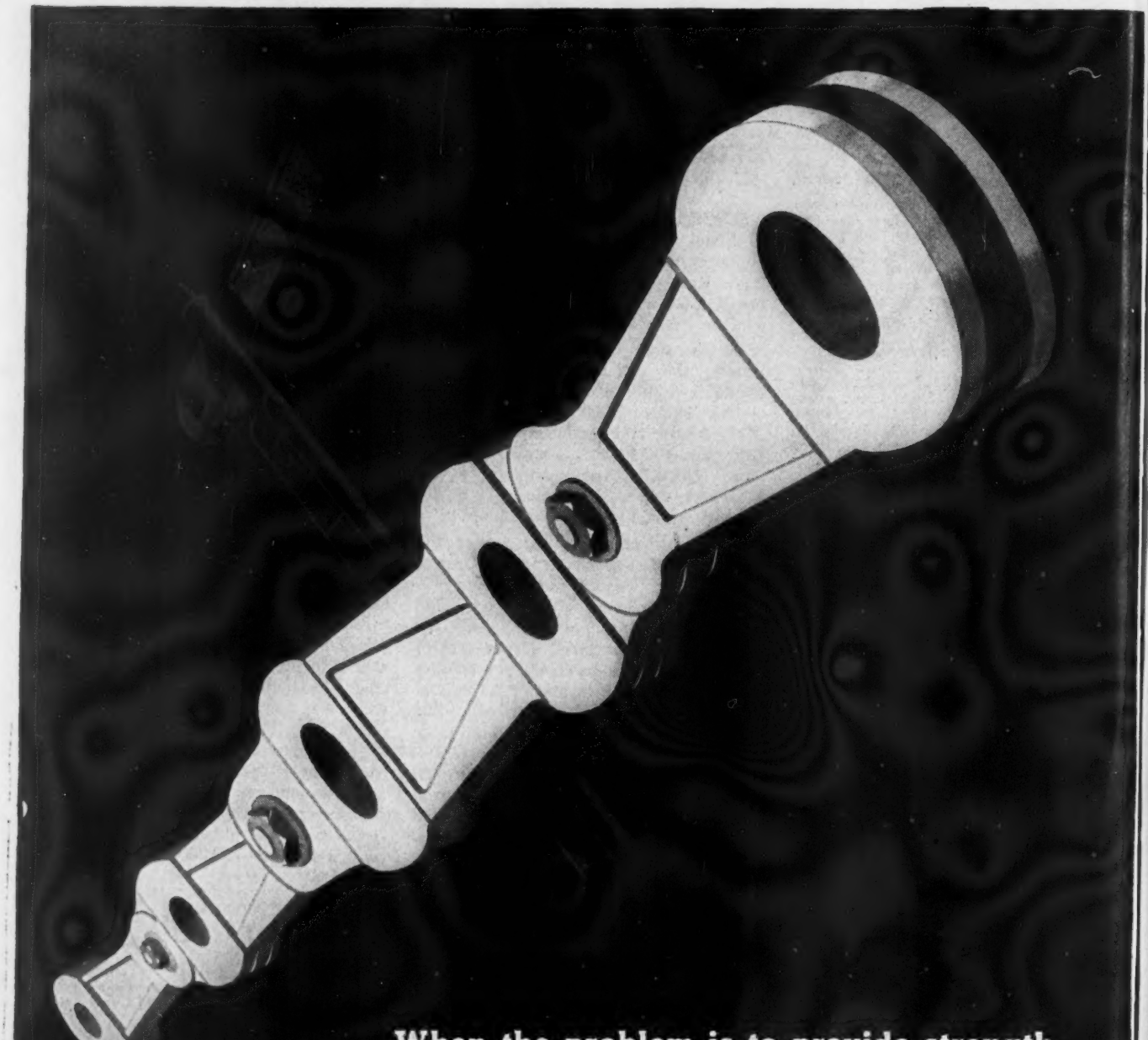
IRON and Steel and Nonferrous Metals Price branches of the Office of Price Administration have been merged into a new branch to be known as the Metals Price Branch, as briefly reported in the preceeding issue of STEEL, July 9.

Purpose of the reorganization is to center pricing activities for all metals into a single branch for closer co-ordination during the industrial reconversion period, OPA said.

Warren M. Huff, former price executive of the Iron and Steel Price Branch, has been named price executive of the new Metals Price Branch. Wylie McKinnon, acting price executive of the Nonferrous Metals Price Branch, has been named associate price executive and Addison T. Cutler has been named economist of the new branch. The ten sections and their chiefs are as follows:

WARREN M. HUFF

Primary and Secondary Nonferrous Metals, Kurt J. Rahlston, chief; **Basic Materials,** Dexter Tutein, chief; **Iron and Steel Scrap,** C. D. Scully Jr., chief; **Steel Mill Products,** Russell Widmer, chief; **Warehouse and Surplus Materials,** (Iron and Steel Products), E. L. Wyman, chief; **Fabricated Products,** W. T. Butler, chief; **Ferrous Castings and Forgings,** Weldon Welfling, chief; **Nonferrous Castings,** Joseph B. Meier, chief; **Analysis and Reports,** Frank Gutches, chief; **Administrative,** Margaret Reeves, chief.



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CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

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By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Ford reaps million dollars worth of publicity by being first to introduce postwar models of passenger cars. Dearborn producer hopes to have all 6000 dealers stocked with at least one car by Labor Day. May fly models to West Coast

BY CONSERVATIVE estimate, Ford Motor Co. must have reaped $1 million worth of publicity incident to the introduction of the automobile industry's first 1946 models. Even though only a dribble of cars will emerge from assembly lines this month, at least they represent a start, and others in the industry looked with envious eyes at the screaming headlines, photographs and newsreels telling of the new Fords. It was characteristic of the Dearborn producer who somehow has always managed to capitalize the breaks when it comes to getting public attention, and even though the elder Mr. Ford was nowhere to be seen at any of the ceremonies, his canny knack for making the front pages could be felt.

A high Ford official told a group of newsmen that Pontiac was all set to make its first announcement of 1946 models on the same day, and was more than a little disgruntled over Ford having stolen its thunder. As a matter of fact, Buick, Olds and Pontiac are all "sitting" on pictures and announcements of their interim designs, awaiting determination of GM corporation policy in this regard.

Ford is understood to be planning a further publicity coup by arranging for a four-engine American Airlines transport to load a couple of the 1946 models at the Detroit airport for shipment to the West Coast, making them the first new automobiles to arrive on the Coast and the first new cars to be shipped by air. Ford hopes to have all his 6000 dealers sampled with at least one car by Labor Day, but the shipping problem to the West Coast will continue to be a tough one, since the assembly plant at Richmond, Calif., is being used as a tank modification center by Ordnance and will not be released until the end of the Pacific fighting and the unit at Long Beach, Calif., is similarly tied up. This necessitates shipping from either Dallas or Chicago, where Ford assembly plants soon will be in operation, along with others at Buffalo, Edgewater, N. J., Louisville, Ky., and Somerville, Mass.

Ford as well as General Motors has always made extensive use of widely scattered assembly plants, shipping parts and subassemblies to these points for making completed automobiles. In normal times, for example, Ford assembled only 13 per cent of his output at Dearborn. This saves importantly on shipping costs, a vital factor in mass production. Chrysler and the independent producers suffer to some extent because of this situation, but may be given some relief as a result of possible readjustment of freight rates following studies made by the Interstate Commerce Commission.

Postwar, an extension of decentralized assembly plants for both General Motors and Ford is in the cards. A new network of Chevrolet and Buick-Olds-Pontiac assembly units already has been drawn up and contracts let for a number of them. Ford will build four new assembly plants, at St. Louis, Atlanta and two undisclosed cities, and for the first time will assemble Lincolns outside the local area.

The new Ford line is described as eventually including six so-called super-deluxe models and three deluxe styles, the former including two and four-door sedans, a five window coupe, sedan coupe, convertible coupe and station wagon; the latter, two and four-door sedans and a coupe. Mercury production will be centered in the Lincoln plant and will include five body styles, although only one or two will be built at the start, around Oct.1.

Technically, the Ford line is claimed to embody a number of improvements, headed by an increase in engine horsepower from 90 to 100 in the V-8 type. The engine, developed originally to power trucks, uses the war-developed tri-alloy bearings of lead, silver, copper and iron, replacing the former cadmium-nickel and copper-lead bearings. How long the new type can be continued depends upon how long it is possible to obtain silver at the present price. Engine cooling system is now sealed and operated under 5 pounds pressure. Aluminum pistons, with four rings, are standard and improved rear main bearing seal has been perfected.

Fuel pump has been redesigned to include a sediment bulb which can be removed for cleaning. Camshaft timing gear has been changed to aluminum for longer life. Neoprene covering has been adopted for covering ignition wires. Valves have been moved outward from cylinders to permit improved water jacketing and better cooling. Both intake and exhaust valve seats have hardened alloy steel inserts.

Valve springs are shot-peened and rustproofed for longer life, while the main leaf on each suspension spring also is shot-peened for added strength.

Virtually all parts formerly made of natural rubber are now of the synthetic type, except for hydraulic brake cups, which are retained in natural rubber since time has not permitted sufficient testing of the effects of brake fluid on synthetic rubber. Tires of course are 100 per cent synthetic, although the first models coming from the line had some old natural rubber tires made in the Ford tire plants, now dismantled. Although Ford engineers report one test car approaching 51,000 miles with its original set of 100 per cent synthetic

THEY'RE HERE: First 1946 Fords move off the assembly lines at Dearborn plant of Ford Motor Co. Assembly line in background is continuing to produce light trucks

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rubber tires, other proving ground tests under rough driving conditions indicate tire life far short of what was normal with natural rubber tires.

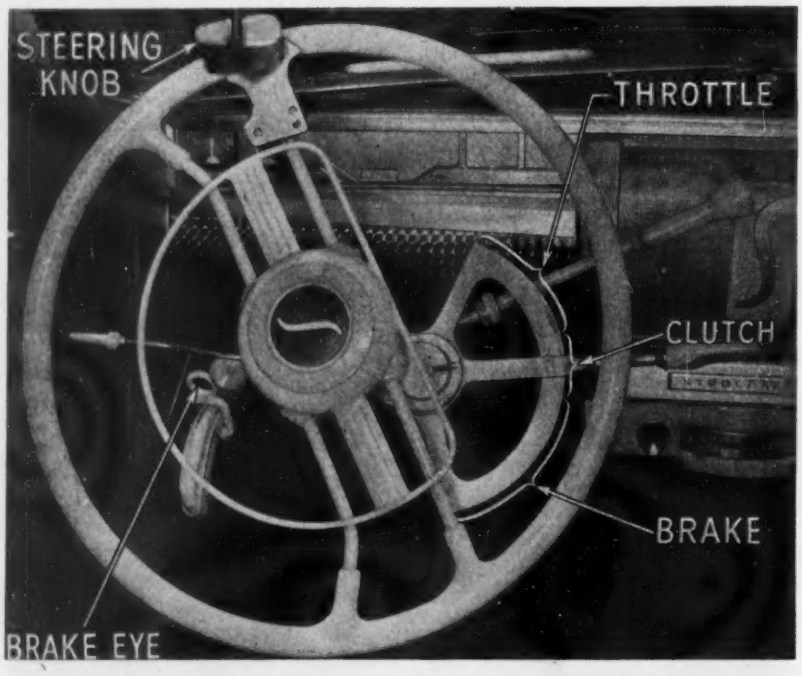
Ford brakes have been redesigned with self-centering slotted shoes, aimed at eliminating squeaks and providing a smoother stop. Eccentric anchor pins have been replaced by fixed pins to simplify replacement of linings. As before, coiled spring protection is provided for all vulnerable sections of hydraulic brake tubing.

Use of aluminum alloy wire crimp in oil bath air cleaners and oil breather caps is a new feature claimed to minimize the formation of varnish which was accelerated by the former copper material used. The present material is an alloy of 96 per cent aluminum and 4 per cent magnesium wire, originally developed as a wartime expedient when copper supplies were short.

So much for the new Ford, except for this final point. The company is making a determined effort to regain a top position in the manufacture and sale of mass transportation. Eventually it will segregate Ford, Mercury and Lincoln dealerships, much as GM has done with its various lines. A dealer will carry only one of the three lines, except in small communities where dual representation will be permitted. Obviously this will call for aggressive merchandising particularly in the Mercury and Lincoln lines. As far as manufacturing is concerned, Ford is well fixed with plants and personnel to carry out expansion to a daily rate of 8000 cars. Whether this record total can be sold without a considerable reinforcing of the company's sales staff remains to be seen. There are some who think that as long as Ford remains a family ownership it will never meet the ambitious goals being projected. Certainly the younger Henry Ford has a tremendous burden of executive direction thrown on his hefty shoulders. His grandfather has gradually transferred to him practically all top authority in the plant and has retired to virtual obscurity himself.

Studebaker is spending better than $1.5 million to concentrate all its war production—now largely M-29 Weasel personnel carriers—in a single building. Involved in the project is a complete duplication of much of the equipment used in the building of this tracked vehicle, including conveyor lines, welding equipment and assembly line fixtures. Two objectives are mentioned—first, the completion of the war orders, and second, earliest possible resumption of passenger car manufacture, dated officially as sometime after Oct. 1. The reshuffling of plant facilities is now well under way, and a four-story building formerly used for storage and driveaways concurrently is being prepared to resume its old function.

Pontiac is reconverting its aerial torpedo plant into a service parts depot for which it was originally built in 1942. More than a mile of overhead conveyors is being installed in the 357,000-square foot building, with the main branch of the system extending to the sheet metal plant several hundred yards distant, permitting a continous flow of painted sheet metal components from the sheet metal department to the warehouse. Meanwhile production of 5-inch assault rockets is continuing, and the company has expressed its willingness to continue production of 155-millimeter shells which over the last six months have been turned out at a rate of nearly four a minute on a 22.5-hour day, six days a week. Initial passenger car output probably will be either two-door sedans, which also will be the case at Oldsmobile, while Buick and Cadillac likely will assemble only four-doors at the beginning of their civilian car production program.



AIDS DISABLED DRIVERS: To make driving simple and safe for GI amputees, automotive engineers have developed this combination of devices. Basis is a large vacuum cylinder built over the engine and working off the manifold which reduces throttle, clutch and brake effort. Control centers in a single lever mounted in the steering column directly over the conventional gear shift. For steering, a special knob, shaped for a firm grip by artificial hand or hook, swivels with rotation of the wheel. Other mechanical features are starter and light dimmer switches on the dash where they can be reached conveniently by the knees and an "eye" on the emergency brake lever for a hook hand

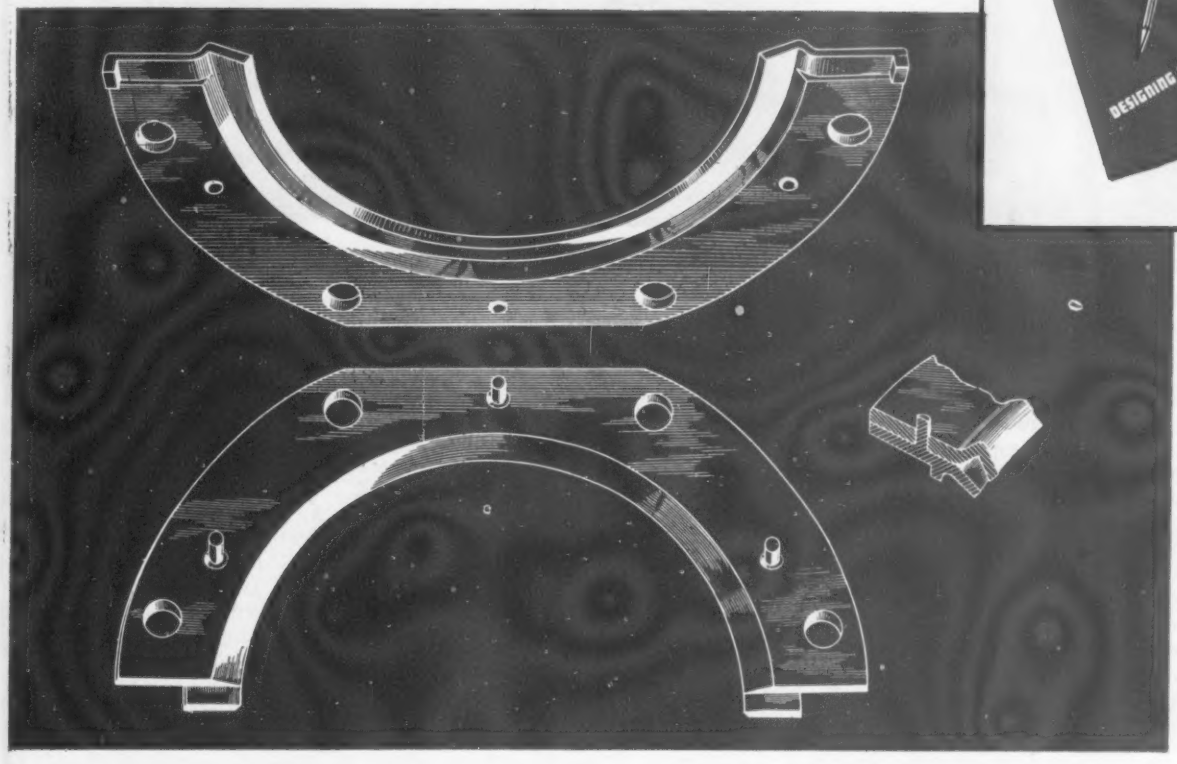
Replica of Tool Shop Erected

Fifty per cent of the floor space at Briggs Mfg. Co. plants has been freed of war work through cutbacks and cancellations, principal remaining jobs being Corsair fighter plane wings, B-29 bomber sub-assemblies, hulls for M-26 tanks and ambulances bodies.

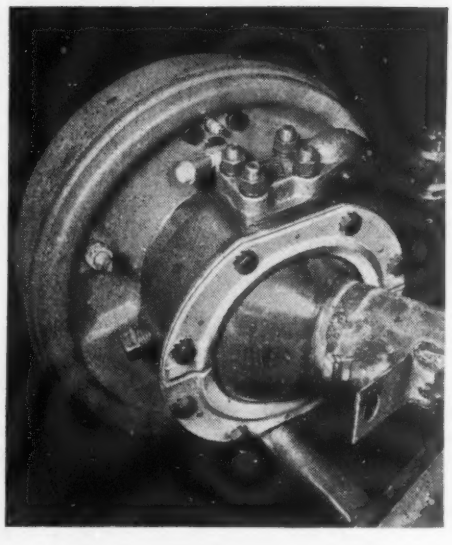
Exact replica of an automotive tool shop has been set up in two 51 x 58 foot buildings at the Percy Jones General Hospital, Battle Creek, Mich., for the training of wounded and handicapped veterans, through the co-operation of companies associated with the automotive tool and die manufacturers association, which subscribed $20,000 in cash and an additional $30,000 worth of equipment for the project. In the first building are five lathes, four tool grinders, three drill presses, two shapers, two milling machines, one cutter grinder, two saws, three sets of measuring gages, micrometers and other inspection equipment, as well as a small tool crib. The second building houses a woodworking shop for patternmaking, and engineering rooms where such subjects as blueprint drawing and tool design are taught.

Continental Motors announces it is in production on the Ford-designed tank engine, contracts for which were signed late last year. About 90 per cent of the 500-horsepower V-8 engine will be manufactured in four Continental plants, two of which had to be tooled completely for the job. Prospects would appear slim this project will be continued much longer in view of extensive tank cutbacks.

DESIGNING FOR DIE CASTING



STUDS



Studs formed as integral parts of a die casting cost less than inserted studs. The need for placing separate inserts in the die is thereby eliminated—speeding production. For best results integral studs should:

1. be sufficiently large in diameter to provide adequate strength (at least ¼" for all except small, light castings)

2. have liberal fillets where they join the casting proper (fillets can be recessed if, otherwise, they prevent proper seating of the mating parts)

3. be threaded only when length does not greatly exceed diameter (consider the use of "speed nuts" with unthreaded-studs)

4. have countersunk or recessed ends when the latter are to be spun over at assembly

5. be cylindrical unless some specific requirement necessitates another shape.

The two zinc alloy die castings shown here illustrate the use of integrally cast studs. These two castings form one half of the grease seal for the universal joints on "Jeep" front axles. Holes are cored in one casting to mate with the integral studs on the other. After a packing is inserted between the castings, the studs are easily headed over—since zinc alloy possesses good ductility.

Additional data on studs, and many other design considerations, appear in our booklet "Designing For Die Casting." To insure that you will get the most for your die casting dollar, ask us—or your die casting source—for a copy of this booklet.

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MEN of INDUSTRY

WALTER F. MUNFORD

GEORGE A. GLEASON

HARRY A. FORD

Walter F. Munford has been named assistant vice president, American Steel & Wire Co., Cleveland. Succeeding him as manager of operations of the Worcester, Mass., district is **George A. Gleason** who formerly was general superintendent of the company's South Works in Worcester. **Van H. Leichliter** follows Mr. Gleason as general superintendent of the South Works. Mr. Leichliter formerly was superintendent, Wire Division, South Works to which position **Harvey R. Rice** has been promoted. **Wade B. Houk** has been advanced to assistant superintendent, Wire Division, South Works, to fill the vacancy caused by Mr. Rice's promotion. **Charles B. Hull,** formerly works engineer at the American Steel & Wire Co.'s Cuyahoga Works, Cleveland, has been made chief draftsman. **Walter L. Longnecker** previously with the company's rod mills at Donora, Pa., has been appointed division metallurgist of hot mills with headquarters in the metallurgical department, Cleveland. **John N. Moylan,** for the past three years assistant treasurer in Chicago, is retiring after 45 years of service with the company. **Walter V. Farr** has been elected to suceed Mr. Moylan and **Samuel M. Rankin** has been appointed credit manager at Chicago, succeeding Mr. Farr.

—o—

Victor V. Nordlund has been appointed assistant plant industrial engineer, sheet and tin mill, Carnegie-Illinois Steel Corp., in Gary, Ind. Mr. Nordlund formerly had been assistant to plant industrial engineer in charge of planning. He has been associated with the Gary plant since 1936.

—o—

Richard P. Dodds, formerly a lieutenant colonel in the Transportation Corps, U. S. Army, has been named manager of the dealer-commodity department, Truscon Steel Co., Youngstown, O. Before entering the service Mr. Dodds was manager of advertising and sales promotion. **Paul L. Callahan,** formerly assistant to Mr. Dodds, has been made manager, advertising department. **Ralph H. Sartor,** formerly a colonel, U. S. Army Transportation Corps has resumed his duties as sales manager, Window & Door Division.

—o—

Peter V. Martin, formerly director of industrial relations, Chicago district of Carnegie-Illinois Steel Corp., Pittsburgh, will head the blast furnace and coke section, Metallurgical Division, U. S. Government Control Council in the German area. **A. H. Chalmers Jr.,** procedure engineer for the company in Pittsburgh, will be production engineer for the ferrous and nonferrous metals groups.

—o—

Fred A. Emm has been appointed general superintendent, Rustless Iron & Steel Corp., Baltimore. Mr. Emm has been superintendent of the wire mill since joining Rustless in 1935.

—o—

John D. Tully has been appointed manager of sales, rails and accessories, Bethlehem Steel Co., Bethlehem, Pa. Mr. Tully has been connected with railroad sales in the company's New York office since June, 1925. **Murray A. Vickers,** formerly of the Cleveland office, has been named to fill Mr. Tully's post in New York. Mr. Vickers has been connected with Bethlehem since August, 1924.

—o—

E. S. Wellock, for the past three years plant manager of Chevrolet Transmission Division, Saginaw, Mich., General Motors Corp., and associated with the company since 1923, has been appointed assistant general manufacturing manager in charge of Chevrolet's 11 assembly plants. He succeeds **E. C. Shaw,** who has resigned.

—o—

Willis L. Wells, formerly chief engineer, Curtiss-Wright Corp.'s St. Louis plant, has been transferred to the Buffalo plant as chief engineer in charge of commercial aircraft design. **Edwin A. Warren,** formerly manager of contracts, St. Louis plant, has been named manager of the commercial sales department in Buffalo. **Nathan F. Vanderlipp** has been promoted to executive engineer of the corporation's Airport Division, supervising engineering work in the Buffalo and Columbus, O., plants. Mr. Vanderlipp has been general manager of the Buffalo Airport plant. **John J. Lee,** general manager of the Kenmore plant will also serve as general manager of the Airport plant.

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Harry A. Ford has been elected a vice president, Maguire Industries Inc., Bridgeport, Conn., and named general manager of its Micro-Ferrocart Products Division. Mr. Ford founded and headed the two firms merged to form the new division.

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L. F. Lottier, for the past 12 years assistant metallurgist, Peoples Gas Light & Coke Co., Chicago, has become metallurgist, Accurate Steel Treating Co., Chicago.

—o—

William P. Husband Jr., former Commissioner of Banks, Massachusetts, has been elected president-treasurer, Ashton Valve Co., Cambridge, Mass. **J. W. Motherwell** succeeds **Ellery Peabody** as chairman of the board. **Philip H. Miller,** Tuxedo Park, N. Y., engineer at Massachusetts Institute of Technology and formerly with General Electric Co., has been elected to the board of directors.

—o—

Archie V. Murray, executive vice president, was elected president, Scaife Co., Pittsburgh, succeeding **J. Verner Scaife Jr.,** who has resigned as president but who retains his directorship in the company. Other officers re-elected are: **A. M. Scaife,** finance vice president; **R. G. Taylor,** secretary; **J. T. Stuart,** treasurer and assistant secretary; **R. E. Cecil,** sales vice president; **E. S. Sedlachek,** sales manager and **J. M. Hopkins,** general superintendent.

—o—

Five men have been appointed to an operating committee to serve with **R. E. Cole,** vice president in charge of engineering, Studebaker Corp., South Bend, Ind.: **Stanwood W. Sparrow,** chief aircraft engine test engineer, now is director

CLEMONS H. DAVIS

R. L. HARTFORD

J. C. SULLIVAN

of research and development; **W. W. Smith,** recently retired Air Technical Service Command officer, now executive engineer in charge of body design and development; **S. A. Jeffries,** head of military truck engineering, now chief truck engineer; **E. M. Douglas,** executive engineer for manufacturing and service; and **H. E. Churchill,** chief research engineer and assistant to Mr. Sparrow.

—o—

Clemons H. Davis has been appointed manager, Foil Division, Reynolds Metals Co., for the Detroit, Cleveland and Pittsburgh areas. Mr. Davis joined the Reynolds company in 1944 as sales representative in the Detroit office and has continued in that position until his recent appointment.

—o—

Charles A. Butcher has been appointed assistant general manager, Crocker-Wheeler Division, Ampere, N. J., of Joshua Hendy Iron Works, Sunnyvale, Calif. Mr. Butcher formerly was manager, Pacific Coast manufacturing and repair department, Westinghouse Electric Corp.

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Harold W. Wright, general manager, Los Angeles Chamber of Commerce, has been elected vice president, Western States Council.

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Otto Allen Owen, Berea, O., has joined Eutectic Welding Alloys Co., New York, as regional field engineer.

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Ralph G. Rogers, works manager, Republic Aviation Corp., Evansville, Ind., plant, has accepted the position of vice president in charge of production, American Central Mfg. Corp., Connersville, Ind.

—o—

E. E. Ratcliffe has been appointed division industrial engineer, Pacific Division, Continental Can Co., New York, and will have his headquarters in San Fransisco. Other plant industrial engineers also named are: **Stanley Bixler,** Los Angeles plant; **M. G. Heilberger,** St. Louis plant No. 48; **W. J. Nelson,** St. Louis plant No. 14; **Leroy Guest,** Kansas City plant; and **Paul P. Pierpont,** Memphis plant. **W. W. Hodgson,** chief industrial engineer is located in Chicago and **L. C. Walgash,** assistant chief industrial engineer, has moved to New York.

—o—

R. L. Hartford, who has been Pittsburgh district editor of STEEL and other Penton publications since 1937, has been appointed assistant manager of research and promotion for STEEL with headquarters in the home office in Cleveland. Mr. Hartford, who has been a member of the editorial staff of STEEL since 1936, is succeeded as Pittsburgh editor by **J. C. Sullivan,** who has also been a member of STEEL's staff since 1936.

—o—

Frank M. Maly, recently was named sales manager for plastic presses, Baldwin Locomotive Works, Eddystone, Pa. For three years prior to joining the Baldwin company, Mr. Maly served as assistant to the vice president in charge of manufacturing, Philip Carey Mfg. Co., Cincinnati, and later as plant manager, chemical section, Plymouth Meeting, Pa.

—o—

Keith Williams, president, Pratt & Letchworth Co. Inc., Buffalo, has been elected chairman of the manufacturing section, Buffalo Chamber of Commerce.

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Matthew J. Dennin has been placed in charge of purchase and sales, New Steel Division, M. S. Kaplan Co., Chicago.

—o—

Edward O. Warner, for many years Philadelphia district sales manager, National Malleable & Steel Castings Co., Cleveland, is retiring from active duty. Mr. Warner has represented the company in Philadelphia as sales agent and later as district sales manager since 1909.

—o—

Lester D. Bigelow, vice president, Hewitt Rubber Corp., Buffalo, has moved to Chicago to supervise Midwest sales. **Frank W. Blanchard** has been promoted to factory manager in charge of all production in the company's Buffalo plants. **Clayton H. Skinner** has been named chief engineer; **T. C. Zinter** has been named manager of belt sales and development; **Harold C. Patterson** has been appointed manager of hose sales and development; **R. G. Mack** has joined the Latex Foam Product Division; Stewart Obilby has been assigned to chemical research on latex foam product development; **Charles F. Monroe** has joined the Eastern Sales Division in New York; **Larry Burmester** has been appointed to the Pacific Coast Division, San Francisco; **Frank B. Speaker** has been added to the field engineering staff; **A. A. Beaulieu,** Cambridge, Mass., has been named a district manager of hose and belt sales in the eastern central states and **James Doyle** has joined the sales staff in the Boston area.

—o—

J. D. Hoffman, formerly manager of sales, equipment section, is now assistant manager of the Switchgear Division, Philadelphia, General Electric Co., Schenectady. **G. A. Gustafson** has been appointed construction manager, Plastics Division, Pittsfield, Mass. Mr. Gustafson, who has been manufacturing manager of that division since March, 1942, will be succeeded by L. S. **Gleason.**

—o—

E. G. Bailey, a vice president of Babcock & Wilcox Co., New York, has been elected an honorary member of the Institution of Mechanical Engineers in England. Mr. Bailey is the fifth American to receive the honor. He has been a vice president of the Babcock & Wilcox Co. since 1930 and he founded the Bailey Meter Co., Cleveland, in 1916.

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Thomas C. Barber has been appointed exclusive sales and engineering representative, Kelly Reamer Co., Cleveland, for the states of Illinois and Iowa.

—o—

New officers of the American Society for Testing Materials elected at the recent annual meeting of the association include: **J. R. Townsend,** materials engineer, Bell Telephone Laboratories, Inc., New York, president; **T. A. Boyd,** head, fuel department, Research Laboratories Di-

A. S. KNOIZEN

Who has been elected a director, Reliance Electric & Engineering Co., Cleveland, as noted in STEEL, July 9, p. 92.

J. C. LUCAS

Who is forming a management engineering department, Meehanite Metal Corp., New Rochelle, N. Y., as noted in STEEL, July 2, p. 78.

W. C. SNYDER JR.

Who is president and general manager, Continental Foundry & Machine Co., Pittsburgh, as noted in STEEL, July 9, p. 92.

vision, General Motors Corp., Detroit, vice president; and the following five members of the executive committee: **John R. Freeman Jr., L. J. Markwardt, Carlton H. Rose, L. P. Spalding** and **William A. Zinzow.**

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H. P. Van Cleve has been appointed purchasing agent, Crown Iron Works Co., Minneapolis.

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W. A. DeRidder has been elected president, Adel Precision Products Corp., Burbank, Calif., replacing **H. R. Ellinwood,** resigned.

—o—

J. F. Joy, formerly director of engineering, Federal Machine & Welder Co., Warren, O., has been elected vice president in charge of engineering.

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Axel W. Hedberg has been named works manager, Marion Steam Shovel Co., Marion, O. He has been associated with General Motors Research, Detroit; Republic Steel Corp., Cleveland; Briggs Mfg. Co., Detroit; and recently resigned as branch manager, St. Clair Division, Parker Appliance Co., Cleveland.

—o—

Don S. Bowers has been elected president, W. C. Norris, Manufacturer, Inc., Tulsa, Okla. **Joe H. Eustice** is executive vice president.

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Harry R. Clarage, Clarage Fan Co., Kalamazoo, Mich., has been elected president succeeding the late **Roland R. Ware. Robert A. Wasson** was elected to the board and was chosen vice president and general manager.

—o—

Dr. Nelson W. Taylor has been appointed technical assistant to the director of research, Minnesota Mining & Mfg. Co., St. Paul. In addition he will continue as head of the ceramics section.

—o—

R. P. Tyler has been appointed general sales manager, Macwhyte Co., Kenosha, Wis. He formerly was sales manager, A. Leschen & Sons Rope Co., St. Louis. Prior to 1940 he served in sales and engineering capacities with John A. Roebling's Sons Co., Trenton, N. J. **H. E. Sawyer,** who has been general sales manager as well as vice president and treasurer, Macwhyte Co., continues as vice president and treasurer.

—o—

Fred S. Gichner Iron Works Inc., Washington, has elected the following officers: **Fred S. Gichner,** president; **Henry Gichner,** vice president; **Joseph Blumenthal,** secretary-treasurer, and **Allen G. Stern,** assistant secretary.

—o—

George D. Gillen has been named general manager, Panamco Ltd., New York, exporter of steel, metals and chemical products.

—o—

W. W. Foster has been named sales manager of the Southwest region, Plomb Tool Co., Los Angeles. The territory Mr. Foster will supervise includes California, western Nevada, Arizona and New Mexico.

OBITUARIES . . .

Charles O. Miller, treasurer, Fort Pitt Bridge Works, Pittsburgh, died recently at his home in that city.

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Alva M. Eubank, 53, superintendent of No. 2 rolling mill, Sheffield Steel Corp., Kansas City, Mo., died July 5 in that city.

—o—

Albert C. Force, 57, assistant to president, Chicago Railway Equipment Co., Chicago, and also associated with its subsidiary, Chicago Mfg. & Distributing Co., died recently in that city. Mr. Force had been affiliated with those companies since 1936.

—o—

Herbert J. Winn, 74, chairman of the board, Taylor Instrument Companies, Rochester, N. Y., died at his home in that city recently. Mr. Winn was elected president of the company in 1913 and was made chairman of the board in 1938.

—o—

Carl G. Olson, 70, vice president, Illinois Tool Works, Chicago, died July 3 in that city.

—o—

Henry P. Mueller Sr., general manager of the Century Foundry, a subsidiary of the Century Electric Co., St Louis, died recently

—o—

Richard Henry Lacy, 79, president, Lacy Mfg. Co., Los Angeles, died July 3 in Pasadena, Calif.

—o—

Herbert P. Mee, 60, former vice president, Caterpillar Tractor Co., Peoria, Ill., died July 3 at his home in Santa Barbara, Calif. He retired in March, 1937, after 17 years' service with Caterpillar and its predecessor companies.

—o—

R. A. Manegold, 63, president, Dings Magnetic Separator Co., Milwaukee, died recently in that city.

—o—

Sir William Ellis, 84, former president of the British Iron and Steel Institute, died July 4.

—o—

Gerald A. Belardi, 29, founder and president, Liberty Engineering Co., Roscoe, Ill., died recently in Rochester, Minn.

—o—

Henry D. Miles, 80, chairman, Buffalo Foundry & Machine Co., Buffalo, died July 5 in that city. Mr. Miles had been associated with the company 45 years, being elected president when it was founded in 1900 and in 1943 becoming chairman of the board.

Steel Plant Disposal Reports Viewed Favorably in the West

Recommendations of Commerce Department and Justice Department received with great interest in area. Small companies would be leased properties under Commerce Department plan. Addition of tin plate capacity urged

SAN FRANCISCO

TWO developments which may affect disposal of war-born western steel plants have been reported from Washington recently. Both are recommendations for disposition of the surplus properties and were issued by the cabinet departments of the federal government.

The Department of Commerce proposes a plan whereby the facilities would be turned over to small companies on a lease basis. The Department of Justice would convert the plants to making tin plate and urges that operation be in the hands of western interests.

The Commerce Department plan, which is to be discussed by a subcommittee of the Senate Military Affairs Committee this summer, proposes that emergency-built steel plants—such as Geneva and probably Fontana—be leased for periods up to 20 years to small companies. The aim of such a program would be to place operation of the plants in the hands of firms which do not have sufficient cash for outright purchase. It is designed primarily to keep big industries from acquiring all of the excess steel plants.

It is indicated that under this proposal no federal loans would be granted for peacetime operation of the plants. However, it is believed by the department that the leasing arrangement would lead to eventual sale of the facilities on an economic basis. During the lease period, it is held, they would be able to build up sufficient working capital to provide the eventual cash payment and maintain enough of a liquid asset position to continue operations. Without sufficient cash assets both for purchase and maintenance of operations, it is believed such ventures by small firms would end in bankruptcy.

Would Require New Legislation

Because the Surplus Property Act now limits lease periods to five years, a new law would have to be passed by Congress to carry out the Commerce Department's 20-year lease plan.

This proposal is viewed by western industrialists as a favorable development in their effort to see the warbuilt plants continue in western hands during peacetime. From time to time several interests have expressed a willingness to purchase the Geneva plants, but lack of sufficient funds has deterred any action toward that end. If, by chance, the lease plan should be approved, these groups probably would be given first chance at the plant over United States Steel Corp. and Colorado Fuel & Iron Corp. which at present are two foremost prospective bidders.

The Justice Department's report (STEEL, July 9) is more a plan for making peacetime operation work than a proposal for disposition of the plants. It believes that the future of steel production in the West depends on conversion of the facilities to production of tin plate. The survey points out that although 20 per cent of all U. S. tinplate consumption is in the western states, before the war nearly all this market was supplied from eastern plants. The report indicates that the market exists for large-scale operations, but says that certain changes in present conditions are necessary to open up the market to the western plants.

As the whole problem of surplus disposal grows larger day by day, the greater it becomes as an explosive economic and political factor. As a sidelight of the potential "dynamite" being stored up was a development which occurred here a few days ago.

At the Kaiser Shipyard No. 4 in Richmond, Calif., new maritime equipment valued at $70,000 was destroyed and converted into nearly worthless scrap. According to officials the surplus equipment was the result of an over-purchase in the frigate-building program. It was destroyed because of a shortage of warehouse space and inability to find a civilian or military market for the material.

As a result of this destruction, workers at the shipyard, who witnessed the action, threatened to cash in their war bonds and to boycott future war bond drives.

This occurrence is only a symptom and a minor example of incidents that probably will be re-created many times over throughout the nation during the next few years. Most taxpayers believe surpluses should be sold to provide the government with revenue. Congressmen say that the administration should "educate" the public to understand that a great deal of war equipment will have to be scrapped. Meantime Congress delays in rewriting the unwieldy surplus disposal law in the fear that a worse statute will result.

BOY POWER USED

Ray Krah, acting manpower director in southern California, last week called upon "boy power" to fill gaps in employment rolls in local war plants. Urging youths on vacation, ranging in age from 16 to 18, to report at once to United States Employment Service offices, Mr. Krah said that Douglas Aircraft Co. is especially in need of 1000 workers at its El Segundo plant to man assembly and installation sections on the C-54 supply transports. Other war industries also are in need of boys, he said.

Los Angeles Manufacturers Asked To List Products

The Los Angeles Chamber of Commerce has requested local manufacturers to list their products with the organization's World Trade Index, an itemized directory given world-wide circulation.

A parallel service of the chamber is contained in continuing studies of southern California industries to ascertain abilities to take part in extensive postwar international trade.

Industries included in the survey are iron and steel products, nonferrous metals and products, tools, hardware, mechanical specialties and aircraft parts.

Many Coast Plants Expect To Add to Their Payrolls

Of 570 Los Angeles plants in war production, 219 believe they are certain to add to payrolls as soon as they can return to civilian production, according to incomplete returns from a survey by the Chamber of Commerce.

In 216 plants, facilities not required on war contracts already are being used for limited civilian goods production.

Some 640 plants not in war production replied to survey question with statements of plans for civilian production as conditions permit. OPA prices were called inadequate by 121 industries while 139 found them adequate.

Form Bank Credit Groups For Termination Loans

Reconversion needs of southern California industry will be met by formation of regional bank credit groups or pools to make "termination loans," T. W. Johnson, vice president, Security First National Bank, told a recent meeting of the Los Angeles Industrial Marketing Conference. The plan has the sanction of the American Bankers Association, Mr. Johnson said, which has pledged itself to meet the conditions attendant upon a return to civilian production.

WING TIPS

Maintenance Division of Air Technical Service Command is complex industrial organization, employing 65,000 civilian workers. Keeps Army Air Forces equipment in tip-top condition all over the world. Twelve repair depots maintained

RESPONSIBLE for maintaining Army Air Forces equipment at top standards all over the world, the Maintenance Division of the Air Technical Service Command is a business organization of the first magnitude.

The maintenance division returns to service all repairable equipment which can be made to meet AAF standards. It gears its production efforts into those of the aircraft industry to keep pace with ever changing demands of the air forces throughout the world.

To provide combat crews with the best equipment in the world in sufficient quantities at the right time and place, the maintenance division supplements the enormous demands made on the aircraft industry. Charged with the responsibility of technical supervision of all AAF equipment, the maintenance division, employing 65,000 civilian workers with a monthly payroll of over $20 million, has developed into one of the largest and most complex industrial organizations in history.

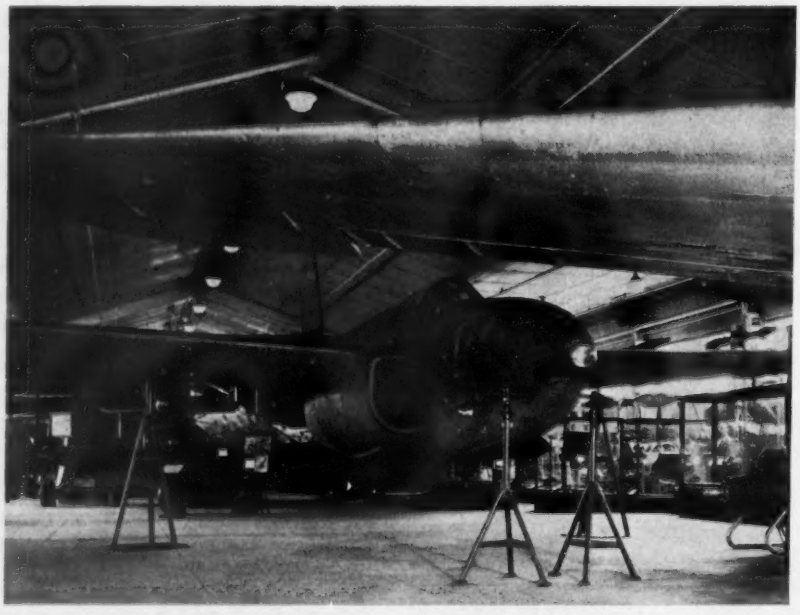
During a recent month, more than 10,000 aircraft engines, 500 aircraft, 89,457 instruments, 12,000 carburetors, 10,000 generators, and thousands of other items were repaired and made serviceable. These figures represent a steady increase in production resulting from the establishment of the maintenance specialization program which concentrates the overhaul of certain types of equipment in two or three depots, and the use of production line methods.

The maintenance division at ATSC Headquarters, Wright Field, O., supervises the operation of 12 mammoth repair depots and the maintenance work of the Atlantic and Pacific Overseas Commands, at Newark, N. J. and Oakland, Calif.

The technical responsibilities of the maintenance division also include the establishment of maintenance, repair, modification and reclamation procedures and instructions on all AAF equipment. This technical supervision is based on "unsatisfactory reports" which are sent in to ATSC Headquarters each time a failure occurs in any part or item of AAF equipment anywhere in the world. During April, 1945, more than 30,000 such reports were received, studied and corrective measures devised in collaboration with ATSC engineering laboratories and with AAF manufacturers. The corrective procedures are returned to the field in the form of technical orders published by the maintenance division.

During 1944, the maintenance division compiled and published all types of AAF technical publications, totaling more than three and one-half billion pages, pertaining to the operation, maintenance, repair, revision, modification, restoration and reclamation of AAF equipment.

To augment the field services, the maintenance division arranges for civilian technical representatives from aircraft and other industrial plants to visit the domestic and overseas AAF commands to check maintenance and operation of the equipment produced by their respective companies.



SMITHSONIAN EXHIBIT: Bell Aircraft Corp.'s XP-59, the first jet-propelled plane built in the United States, is on exhibition in the Smithsonian Institution, Washington. This propellerless fighter is the only modern airplane in the aircraft section of the museum

"War Nerves" No Obstacle To Efficient Production

National concern over the "employability" of "war nerves" cases may be unduly exaggerated if a recent survey of nervous workers at the Wright Aeronautical Corp.'s New Jersey plants is any indication. The study established that such workers were as dependable and productive as employes without nervous ailments.

During a ten month period, 455 applicants for employment were interviewed by the company psychiatrist because of extreme nervous conditions, the report said. Some of this group were described as severe cases of "war nerves." They were placed on jobs building Cyclone 18 engines for B-29 Superfortresses after receiving the same training accorded to normal workers. At the end of the ten month period a check revealed that 250, or 54.9 per cent were still employed, and 205, or 45.1 per cent had moved into other fields of employment.

The records of 455 non-nervous employes hired during the same period for similar jobs were then studied. Two hundred and forty-five, or 53.8 per cent, were still employed and 210, or 46.2 per cent, had shifted to other work.

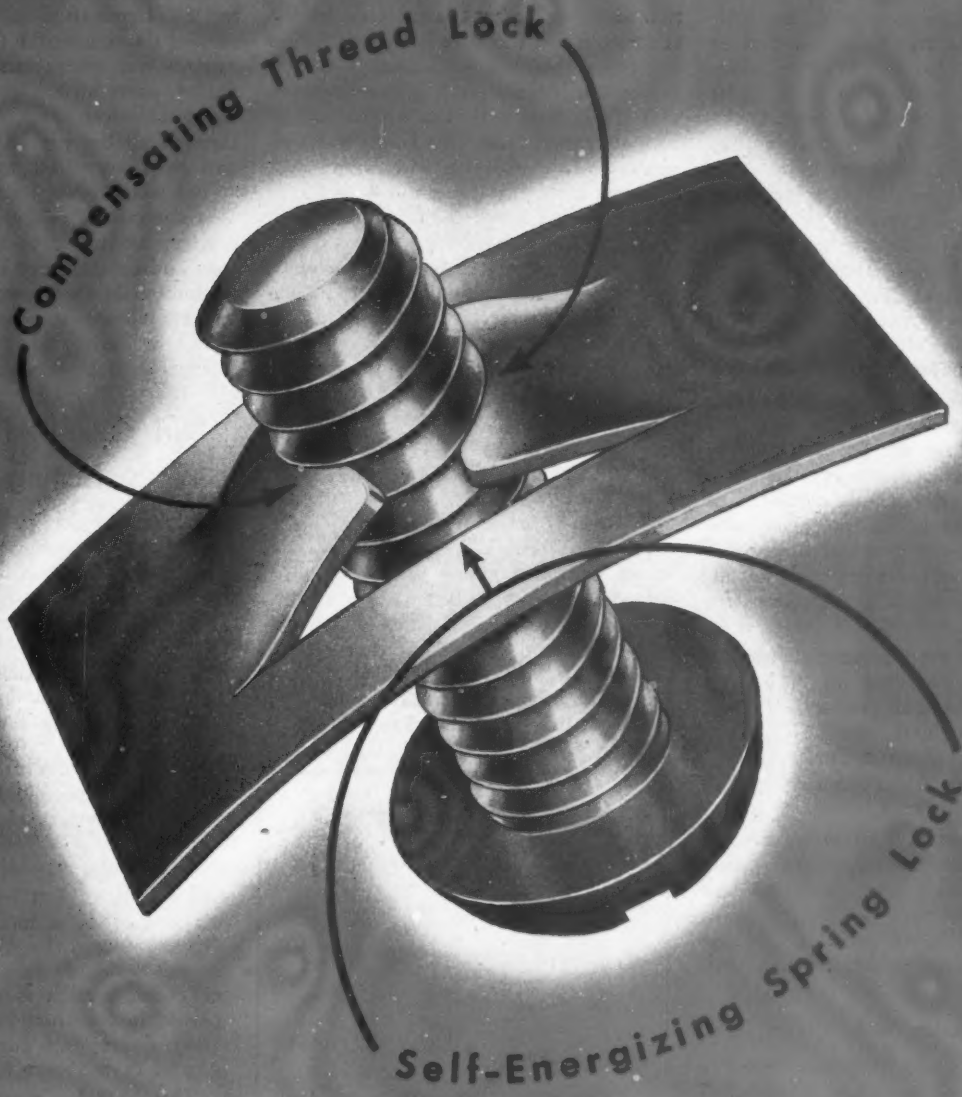
Each employe's record of employment was thoroughly examined, the study delving into work habits, quantity and quality of work, absenteeism, and accident rate. In all respects, it was concluded, the so-called nervous group was as good as the average group.

Aircraft Production in June Drops 9 Per Cent

Aircraft production for June fell short of schedule by 228 planes, breaking a three-month record of schedule achievement, J. A. Krug, chairman, War Production Board, has announced. During June, 5794 aircraft were accepted compared with a schedule that called for 6022 planes. Production of B-29s was on schedule in all plants, however, with two companies exceeding their quota to such an extent as to account for a 4 per cent increase over scheduled production.

In terms of airframe weight, excluding spares, 63,300,000 pounds were produced in June compared with 71 600,000 pounds in May. Thus, June acceptances in terms of both numbers and airframe weight were 9 per cent below those of May.

NOTHING LOCKS LIKE A SPEED NUT



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FASTEST THING IN FASTENINGS

ATSC Reduces Time for Settlement of Cut or Canceled Contracts to 12 Days

WHEN war contractors producing AAF equipment in the Air Technical Service Command's eastern district have their contracts cut or canceled due to shifts in the war or to other reasons, financial settlement proposal forms which they file with the government for post-termination payments are being processed and checks mailed within an average period of 12 days, according to Col. Kenneth Collins, eastern district commanding officer. This represents a cut of more than 65 per cent in the time required to complete negotiations and effect settlements less than one year ago.

The 12-day period only applies where acceptable claims are filed by contractors, according to Colonel Collins, because there still are many instances where contractors, through oversight or lack of experience in preparing the standard settlement proposal forms, fail to follow instructions completely or include claims for items not approved for payment.

The district's readjustment division is responsible for handling all AAF contract termination and property disposal activities throughout the 11 northeastern states. Approximately 25,000 plants producing Air Forces equipment are located in this area.

Within the past 24 months, the division opened 3300 termination and cutback cases. This represents almost half of the overall cut of 30 percent in the aircraft industry. Ninety per cent of these cases have been settled and closed; the remainder are in the process.

Quick Action Saves Money

Of the 3300 cases, 1020 cases with an original dollar volume of $1,170,644,587 were settled at a cost to the government of $95,068,595. Thus, as a result of quick action by the ATSC in cutting or canceling these contracts when sufficient equipment had been produced, or requirements changed, more than $1,075,575,000 was saved and released to the Treasury for other necessary expenditures. In addition, critical metals and materials were freed for further essential production, and contractors were assisted in speeding up reconversion physically as well as financially. Approximately 1950 cases of the 3300 total, or 50 per cent, were settled or closed at no cost to the government.

The three-hundred-odd cases now in the process of negotiation and settlement represent a gross dollar volume of slightly more than $572,423,599.

One of the biggest problems encountered by the services in settling claims arising from terminations is the time lost between the date a cancellation notice or cutback is received by the contractor and the date he actually files an acceptable claim, Colonel Collins points out. "Many contractors, knowing that Uncle Sam will always take care of his obligations, are inclined to wait weeks and months at a time before they even get around to filling out their standard settlement forms and filing them with the appropriate service," the colonel stated. "Hence we have an average time of settlement for fixed price contracts of 4.3 months from the date the notice is first received by the contractor until final payment is made—and an average settlement time of only 0.3 months or 12 days from the date an acceptable claim is filed." During the past ten months the first figure has dropped from 5.7 months; the second from 1.2 months.

During World War II the ATSC has saved taxpayers more than $6 billion through its contract termination and readjustment activities. This is substantial when compared with a grand total of $21 billion for all services. In April of this year alone, terminations of Air Forces contracts amounted to $1.2 billion as against $600 million for all other services combined.

To assist and prepare war contractors for possible eventual termination of their contracts, half-day termination clinics or "work sessions" are now being sponsored by 21 termination co-ordination committees throughout the country. In these sessions war contractors learn the termination procedures "by doing." Given a hypothetical case, they are taken through all the procedures step by step and then permitted to keep their corrected work sheets for future references. War contractors producing for any of the services are urged to take advantage of this unusual training by contacting the committee in their own area, to arrange for attendance at an early future session. Sessions are limited to 50 contractors or their representatives.

JOHN M. GLADDEN

New president of Kinner Motors Inc., Glendale, Calif., Mr. Gladden announces the company is embarking on a strong postwar program that will take it into many fields other than aircraft, which it has served since 1919. First of the postwar products to be announced is a small gasoline engine which is claimed to have wide applications in the industrial field. Mr. Gladden succeeds Earl Herring as president of the company; the latter resigned to devote his time to other interests.

Wind Tunnel Affords Flexible Testing Conditions

A variable density wind tunnel, said to contain the most highly flexible range of testing conditions in the country and capable of testing airplanes in the fast-as-sound range, has been built by Curtiss-Wright Corp., Buffalo. It contains an air volume of 210,000 cu ft, equal to cubic air volume contained in 16 six-room houses. Tunnel's flexibility of testing range is expected to permit testing of models of all types of planes, accomplishing in less time and in one place work previously performed by three or four tunnels.

Tunnel has 378 ft of circuit length and an 8½ x 12 ft test chamber, allowing testing of a model of 10-ft span. Overall tunnel length is 178 ft, and overall width 81 ft. Steel used in tunnel's construction is equal to that employed in construction of a heavy U. S. Navy destroyer. Tunnel is 36 ft from ground at maximum height.

The 15,000-v power supply for the tunnel is brought into the plant through a 10,000-kva outdoor substation, where it is reduced to 4800 v for use with 14,000-hp General Electric drive motors. Power service is said to be adequate for tunnel to operate 24 hrs a day with good voltage regulation.

Using four special compressors, air in the ¾-in steel shell may be pumped to four times atmospheric pressure, or 60 psi. Tunnel also may be evacuated to a pressure of 4 psi, equivalent to minimum pressure encountered in flight at 30,000 ft.

Another feature of the tunnel is its test chamber which may be sealed off from remainder of tunnel, permitting airplane models in the chamber to be changed or worked on without changing test pressure. Tunnel may be operated by three men, a power operator, a balance operator, and a tunnel control operator. All operations may be performed from outside the tunnel.

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Above: Sectional view of Ex-Cell-O precision boring department for miscellaneous production parts.

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- Multiple Spindle Automatic Screw Machines
- Single Spindle Automatic Screw Machines
- Hand Screw Machines
- Centerless Grinders
- Single and Multiple Spindle Drilling Equipment
- Plain O.D. Grinders
- Plain I.D. Grinders
- Milling Machines
- Broaching Machines
- Precision Thread Grinders
- Precision Boring Machines
- Lapping Machines
- Special High Production Equipment

UNIT ASSEMBLIES

For many years Ex-Cell-O has supplied large and small manufacturers with parts and has also supplied many parts in unit assemblies after machining, heat treating and grinding.

INSPECTION

Ex-Cell-O has always maintained that quality in a product is not the result of accident; that quality is built into a product by rigid adherence to accepted quality standards . . . standards that are upheld at Ex-Cell-O by efficient inspection at every step of the machining process.

Stainless Steel To Be Produced By New Firm

Sheet and strip production expected to be started at Washington, Pa., plant in March, 1946

FACILITIES previously owned by the Washington Tin Plate Co. at Washington, Pa., will be occupied by a newly organized corporation known as the Washington Steel Corp. which will produce stainless steel in sheet and strip form. Operations of the new company are scheduled to begin in March, 1946.

Directors of the company have been announced as follows: W. F. Crawford, president, Edward Valve & Mfg. Co., East Chicago, Ind.; J. A. Downey, former president, Eastern Rolling Mill Co., Baltimore; F. C. Gerard, formerly plant superintendent, Eastern Rolling Mill Co.; E. L. Parker, president, Edgar T. Ward's Sons Co., Columbia Steel & Shafting Co. and Summerill Tubing Co.; J. B. Warden Jr., vice president and trust officer, First National Bank, Pittsburgh; Henry H. Hood of Henry G. Hood & Sons, Washington, Pa.; Guy Woodward, T. S. Fitch, George E. Diamond and John H. Davidson, all of Washington, Pa.

Mr. Fitch has been elected president of the new company, Mr. Diamond will serve as treasurer, Mr. Gerard as vice president in charge of operations, and Mr. Davidson as secretary and counsel.

Operations will cover 116,000 square feet of floor space, including nine buildings. A new Sendzimir cold rolling mill is being built by Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., and delivery is promised for early February, 1946. The mill will handle coils up to 37 inches in width. Other equipment includes shear, annealing, pickling, slitting, and leveling facilities. The mill will roll gages from 0.003 to 0.093 inches.

Maximum employment at the plant will be approximately 175.

The Washington Tin Plate Co. has been out of business for more than two years, and all of its equipment, most of it hand-operated, was sold in the export market.

Ship Construction Exhibit Sponsored by Consolidated

An exhibit showing various stages of ship construction has been placed on view at the Los Angeles Museum by Consolidated Steel Corp. Plastic models, photographs and drawings are used to convey detailed information on assembly and launching of cargo vessels.

COILING 40-MILE CABLE: This continuous cable, 40 miles long and having an outside diameter of 4⅝ inches, is shown being coiled on a huge platform at the Phelps Dodge Copper Products Corp. plant in Yonkers, N. Y. The cable was kept filled with water under pressure to prevent its being crushed by its own weight. It was used as a pipeline under the English Channel to help supply Allied armies with fuel

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

General Electric Co., Schenectady, N. Y., has purchased a 65-acre site in Middlebury Street, Elkhart, Ind., for a postwar electrical appliance manufacturing plant.

—o—

Swedlow Aeroplastics Corp., announced that its new address is 8990 Atlantic Avenue, South Gate, Calif.

—o—

Maxwell Steel Co., Fort Worth 1, Tex., has under way a $100,000 expansion program of new buildings and machinery for fabrication of steel products.

—o—

H. K. Porter Co. Inc., Pittsburgh, has established a new office at 513 Colorado Bldg., Washington, with Harold L. Kennedy as district sales manager.

—o—

Thompson Grinder Co., Springfield, O., is introducing a new machine to do crush form contour grinding on surface grinders.

—o—

Automatic Transportation Co., Chicago 20, has established an export department at 431 South Dearborn Street, Chicago 5, under management of Carl M. Wynne.

—o—

Grand Rapids Brass Co., Grand Rapids, Mich., has been notified by the Detroit Ordnance District to terminate production of Army bomb nose fuzes. More than 725,000 bomb nose units, valued at more than $1 million, are affected by the cancellation.

—o—

Porcelain Steel Inc., Cleveland, which has been reorganized will be known as Republic Industries Inc., Porcelain Steel Division, and not as Republic Steel Co., Porcelain Steel Division as was reported recently in STEEL. Don D. Smith is president and treasurer.

—o—

Graham-Paige Motors Corp., Detroit, is establishing a Farm Equipment Division for manufacture and sale of the Rototiller, a new tractor, and other agricultural machinery at the company's subsidiary, Warren City Mfg. Co., Warren, O.

—o—

Crosley Corp., Cincinnati, has appointed Cia Mexicana Electro-Mercantil S. A., Mexico City, as distributor of household electrical appliances.

—o—

Norton Co., Worcester, Mass., has appointed Swind Machinery Co., Philadelphia, as exclusive dealer for Norton

grinding and lapping machines in eastern Pennsylvania, eastern Maryland, southern New Jersey, and Delaware.

—o—

Columbia Aircraft Products Inc., Somerville, N. J., has purchased the plant of Palmer Bros. Engines Inc., Colcob, Conn., which has been manufacturing marine engines for the government. The Connecticut plant will be operated as a subsidiary, with all personnel retained and marine engine output continued.

—o—

Chicago-Latrobe Twist Drill Works, Chicago, announced that its district representative, Jack M. Wilhite, will have as his new territory Louisville, Arkansas, Texas, Oklahoma, and Kansas, except the northeastern tip comprising the Kansas City, Kans., area.

—O—

Maguire Industries Inc., Bridgeport, Conn., has purchased and merged into its organization the Meissner Mfg. Co., Mt. Carmel, Ill. Thordarson Electric Mfg. Co., Chicago, has been merged as a new transformer manufacturing division into Maguire Industries, and Ferrocart Corp. of America and Micro Products Corp. have been merged into the Micro-Ferrocart Products Division of Maguire. Operations of Micro-Ferrocart have been moved from Hastings-on-Hudson, N. Y., to Stamford, Conn.

—o—

Mathieson Alkali Works Inc., New York, has completed a $400,000 addition to its Saltville, Va., carbon dioxide plant which will provide a substantial increase in supply of dry ice and carbonic gas to users in the South and Southwest.

—o—

Light Metal Machinery Inc., 607 Ariel Bldg., Erie, Pa., recently organized, will manufacture and distribute high production machines for fabricating zinc, aluminum, magnesium, and other light metal alloys. President is Ward F. Martin, former president of G & N Mfg. Co., Cleveland, and until recently in charge of die casting machine sales for Cleveland Automatic Machine Co., Cleveland.

—o—

Ekco Products Co., Chicago, has purchased the Massillon Aluminum Co., Massillon, O. Present management of the Massillon plant will remain unchanged.

—o—

Reynolds Metals Co., Richmond, Va., announced that the extrusion plant it operates at Louisville for Defense Plant Corp. will be expanded under a $2 million project to speed production of extruded aluminum.

—o—

Udylite Corp., Detroit, is increasing facilities of both of its Detroit plants to meet anticipated heavy postwar demand for its products.

AWARDS . . .

Award of the Army-Navy "E" for excellence in manufacture of war materials has been made to the following:

Alabama Pipe Co., Ornamental-Emory plant, Anniston, Ala.

American Radiator & Standard Sanitary Corp., Baltimore works, Baltimore; Pittsburgh plant, Pittsburgh; and Buffalo plant, Buffalo.

Anchor Slide Fastener Co., New York.

B. A. Ballou & Co., Providence, R. I.

Bendix Aviation Corp.'s Radio Division, Baltimore.

Central Foundry Co., Southern Division, Holt plant, Holt, Ala.

Chase Brass & Copper Co. Inc., Cleveland mill, Euclid, O., and Euclid Case plant, Euclid, O.

Cherry Rivet Co., Los Angeles.

Columbia Aircraft Products Inc., Somerville, N. J.

Consolidated Vultee Aircraft Corp., Tucson, Ariz.

Doehler-Jarvis Corp., Doehler Die Casting Division, Chicago.

Durabilt Mfg. Co., Plants 1 and 2, Aurora, Ill.

Federal Telephone & Radio Corp., Newark, N. J.

Edwin I. Guthman Co. Inc. & Lincoln Machine Tool Co., Chicago.

Hill Independent Mfg. Co., Philadelphia.

Ideal Clamp Mfg. Co. Inc., Brooklyn, N. Y.

Illinois Gear & Machine Co., Chicago.

Independent Pneumatic Tool Co., Aurora plant, Aurora, Ill.

Johnson Gage Co., Bloomfie'd, Conn.

Johnston Lawn Mower Corp., Ottumwa, Iowa.

Lewis Welding & Engineering Corp., Bedford, O.

Lockley Machine Co., New Castle, Pa.

Clayton Mark & Co., Evanston, Ill.

Mine Safety Appliances Co., Callery plant, Callery, Pa.

Monroe Tool & Mfg. Co., Monroe, Mich.

Nathan Mfg. Co., New York.

National Foll & Foundry Co., Avonmore, Pa.

Schnabel Co., Pittsburgh.

Sprague Electric Co., North Adams, Mass.

Union Wire Rope Corp., Kansas City, Mo.

Vogt Bros. Mfg. Co., Louisville.

Wichita Engineering Co., Wichita Fal's, Tex.

Williams Tool & Engineering Corp., Indianapolis.

National Steel Completes Debt Reducing Program

National Steel Corp., Pittsburgh, has completed a program which reduces its debt by $14.5 million and eliminates the requirement for sinking fund payments for 13 years.

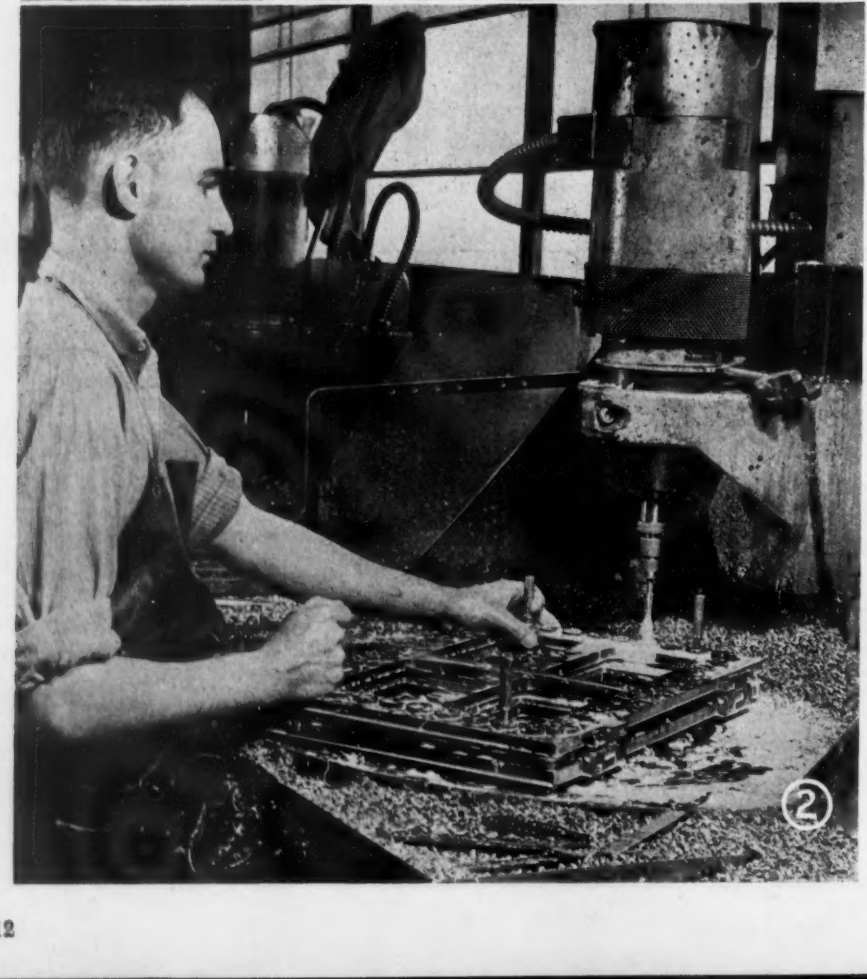
The $14.5 million debt reduction was achieved by retirement in advance of the corporation's outstanding serial notes amounting to $4.5 million and by purchase of $10 million of its 3 per cent first mortgage bonds, which have been delivered to the trustee under the indenture for application to sinking fund requirements.

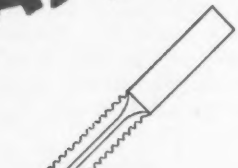
With completion of this transaction, the total remaining funded debt of the corporation has been reduced to $40 million, all of which consists of 3 per cent first mortgage bonds.

NEW RAILWAY CAR PLANT: New 24½-acre railway car manufacturing plant of the Edward G. Budd Mfg. Co. in northeast Philadelphia where production of the first Budd-built stainless steel trains since 1941 will get underway next autumn. Orders on hand and in prospect will keep the plant busy for years

Exceptionally Efficient Hole Production Methods Employ New Developments in

HIGH-SPEED DRILLING REAMING TAPPING





By G. W. BIRDSALL
Associate Editor, STEEL

Fig. 1—As high as 3100 holes are reamed hourly on this setup, one hole at a time. Centrifugal feed drill-head utilizes 2-speed motor, the low speed being used for dynamic braking when resetting the feed mechanism

Fig. 2—Here the operator drills 1/4-in. holes in 1/4-in. thick 24ST aluminum at rate of 720 per hr—one every 5 sec. Note plugs in drilled holes, positively locating work in fixture while drilling remainder of holes

Semiautomatic setups are individual motor-driven heads equipped with a feeding device centrifugally powered and controlled. At one installation, a single operator in a 10-hour shift handles any one of the following hole production jobs, working one hole at a time:

——ream 22,000 ⅜-in. holes in ¼-in. thick SAE-1010, or

——drill 7200 ¼-in. holes in ¼-in. thick 24ST aluminum, or

——tap 9800 holes in 3/16-in. thick parts of SAE-1010 steel

CENTRIFUGAL force is put to work in an unusually effective manner in the special power heads designed and built by Govro-Nelson Co., Detroit. A number of manufacturers report obtaining exceptionally high outputs in drilling, reaming and tapping when using these automatic units.

As will be explained, operation of these units is such that they automatically advance to the work, go through it at highest possible speed consistent with the job, return automatically to initial position and stop. Operating cycle can be repeated about as fast as new work can be located under the tool.

Cut Drill Breakage: They have been found valuable in drilling holes as small as 0.028-in. in diameter since the "floating" action of the centrifugal feed device avoids the troubles encountered with positive feed mechanisms, yet at the same time, the insistent "push" exerted assures going through the work at greatest possible speed. This action results in exceptionally low drill breakage, for instead of jamming and breaking when a hard spot is encountered, the drill "floats" against the work until it cuts through.

Figs. 3, 5 and 6 show some of the high production setups where several of these automatic drilling heads have been grouped on a fixture to handle up to eight or more holes in different planes and at various angles—all drilled simultaneously. Since the automatic head is small and compact, these units can be mounted very close together. Where work involves holes too close together to be drilled simultaneously by adjoining heads, a simple 2-position fixture can be evolved to do the job. What can be done by these automatic heads in cutting production costs where holes are involved appears to be limited only by the ingenuity of the tool engineer handling their application.

Davis Tool Installation: But before examining the operation of these automatic units, let's see how they are used at a plant that has obtained rather exceptional results with them—the Davis Tool & Engineering Co., Detroit. Marshall Ragland, assistant to W. N. Davis, president, reports that early in our aircraft program, the stamping department of this company obtained large orders for "insert rings" for bullet-proof gasoline tanks for airplanes. Most of these rings are made from either ¼-in. thick plain carbon steel (SAE-1010) or 24ST aluminum of same thickness, although some rings are made from somewhat thinner stock.

Immediately the hole production problem was encountered. And it is no small one, for when 48 holes must be drilled in each piece with centers accurate to within plus or minus 0.005-in. and with holes round and to size within 0.0005 in. limits, production costs could easily rise out of all proportion. Therefore it was essential to develop some economical method of producing these holes accurately and extremely fast.

The way it is done is shown in accompanying illustrations, Figs. 1 and 2. Each drilling station employs a single Govro-Nelson automatic drilling head, Model H, fixed on a rigid mount at the correct height above the working surface.

The work to be drilled is clamped in a fixture fitted with hardened steel inserted-type bushings, see Fig. 2. The operator slides the work and fixture around on the machine top to center the bushings under the drill in rapid succession. As soon as he positions the work for a hole, he steps on the foot treadle actuating electric contacts which cause the drill head to go through its work cycle, as will be explained. The operator need only start the cycle, it proceeds automatically once initiated; the drill approaches the work, feeds into and through it, and returns to initial position, allowing the fixture to be moved to the next position.

The visitor is amazed at the speed these operators obtain. One operator was asked how he located the work so accurately under the drill head so fast. He said it was easy, he could almost do it with his eyes closed. Cha-ung, cha-ung goes the machine, just about as fast as you read this. At each "cha", the drill goes down through the work, quickly followed by the "ung" as the drill slows down and returns to position.

More than 100 different sizes, types and shapes of insert rings are produced here. Many are oval in shape, some are square, others round, and still others are odd shaped. There will be from 4 to 48 holes in the ring for mounting. A typical ring will be approximately 18 x 22 in. outside diameter and oval in shape, be made from ¼-in. thick 24ST aluminum and have a rim 1-in. wide. It will have 48 holes equally spaced around its periphery and located halfway between the inner and outer edges of the rim.

First operation in production of such rings is to blank them from sheet stock, using double acting dies to cut the outline and then cut off the ring from inner section in a single stroke of the press. Outside skeleton is scrapped. In many cases, it is possible to use the inner section of the stock for blanking out smaller size rings.

Typical Production Jobs: Here are typical hole production jobs being done in this plant with individual Govro-Nelson automatic drill heads as shown in Figs. 1, 2 and 4. Mr. Ragland points

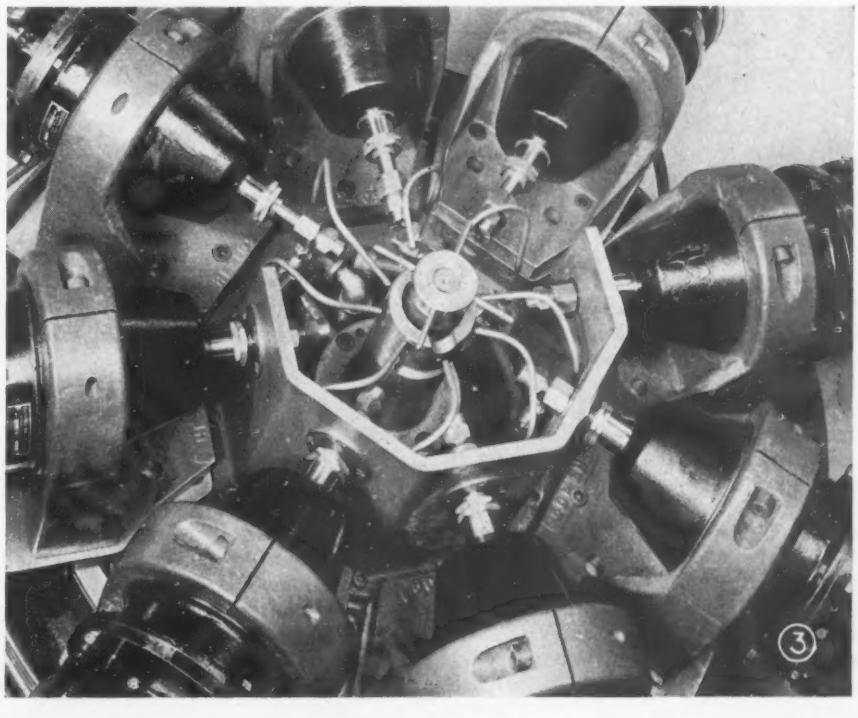


Fig. 3—These eight Model H units, mounted on an angular baseplate for convenience in loading, drill eight 9/32-in. holes through ⅜-in. of steel in 2 sec drilling time. Shield around lower portion keeps chips and coolant in center for flushing out through fixture

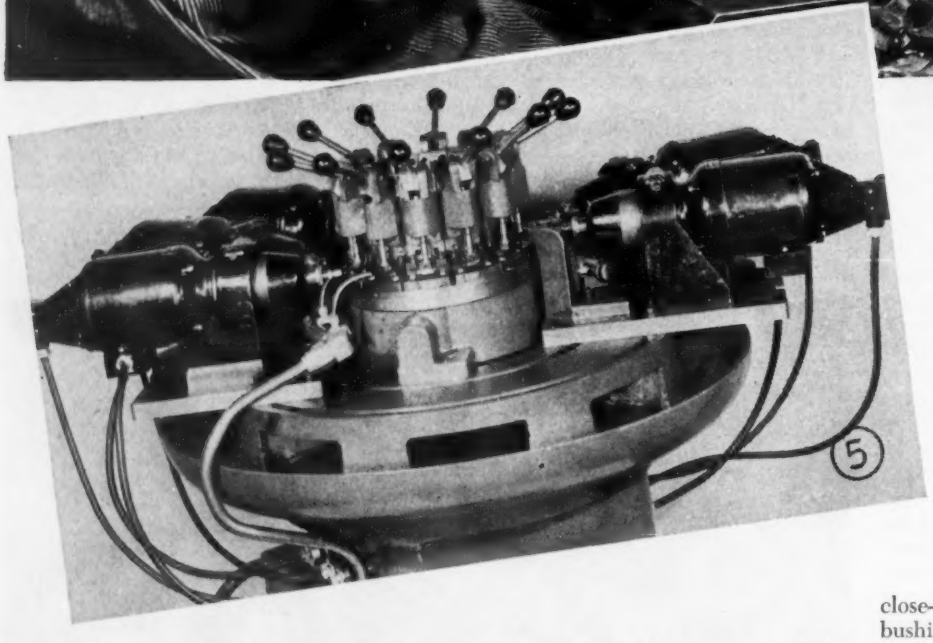


Fig. 4—Worker easily taps 980 holes per hour on this fast-acting setup. Limit switch reverses tap to back it out automatically. Figs. 1, 2 and 4 show installations at Davis Tool & Engineering, Detroit; photos by Birdsall

Fig. 5—Here five Model E units are arranged radially around an indexing fixture with speed clamps for handling a high output of small parts. Note how round table facilitates moving drill-heads to change the setup

out that these are not done on multiple head setups like those in Figs. 3, 5 and 6, because of the great variety of hole center spacings, hole sizes, and the like which would require too many setups to handle them economically on multiple heads.

Drilling 720 Holes Per Hour: On each of the 18 x 22-in. oval rings of ¼-in. thick 24ST aluminum previously mentioned, 48 holes ¼-in. in diameter must be drilled one at a time. The operator in Fig. 2 handles 150 such pieces in a 10-hr shift, a total of 7200 holes, or an average of 720 per hour . . . that's 12 every minute—one every 5 sec.

And the radial tolerance on hole centers here demands an accuracy of plus or minus 0.0025-in. Where maximum accuracy is required, work goes through another operation where the holes are reamed.

Largest size hole that is involved in production here is ⅜-in. diameter, drilled in ¼-in. thick 24ST aluminum at rate of 600 per hour.

As can be seen in Fig. 2 where a rectangular ring is being drilled, the work is clamped between upper and lower sections of a fixture that contains the hardened inserted guide bushings for the drilling operation. Mr. Ragland reports that the system employed is to drill the first hole near one end, then insert a close-fitting plug down through guide bushing and work to hold the part positively while the fixture is swung around and a hole drilled in the opposite side and similarly plugged. For large rings, four such plugs are employed, as shown in Fig. 2.

Using these plugs as handles, the operator slides the fixture around on the work table to line the drill up with the bushings in rapid sequence. As soon as the work is positioned for drilling at any spot, the operator steps on his foot treadle operating electric contacts that cause the drill head to go through its cycle, automatically going down through the work and returning to the original position.

Reaming 3100 Holes Per Hour: Since

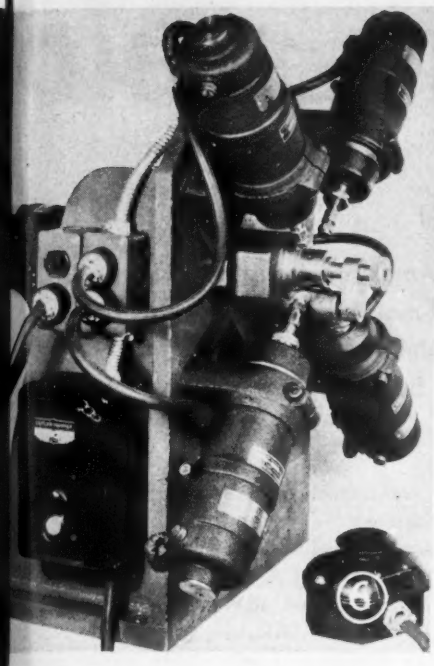


Fig. 6—Five small high-speed units (Model C) with free speed of 12,000 rpm are set to operate two No. 49, two No. 65 and a No. 50 drill in production of brass fuze parts with an output of 12 parts per minute

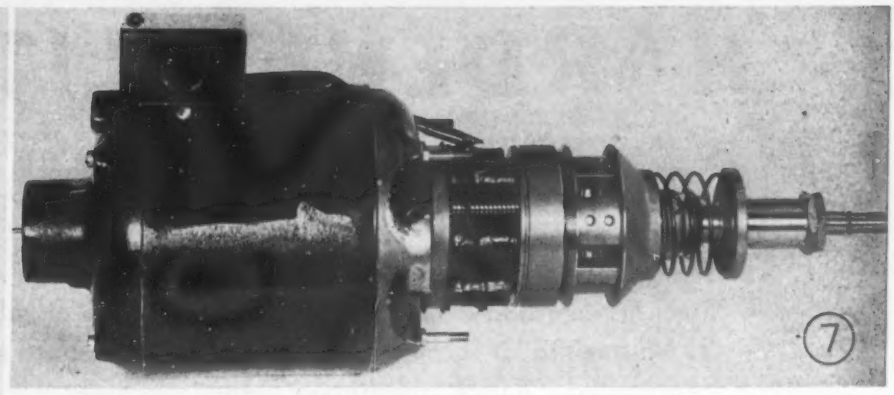


Fig. 7—Feed mechanism of a Model C unit is revealed by removing housing to show weights, cups, electric brake and other elements therein

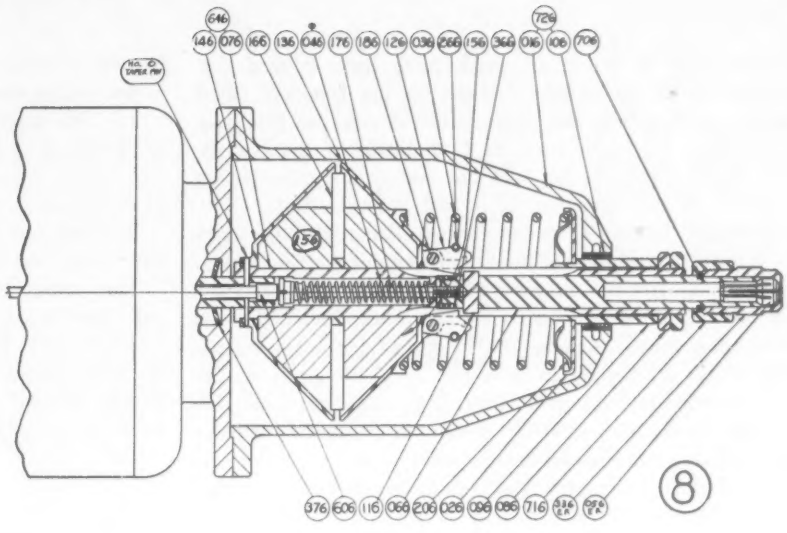


Fig. 8—Sectionalized view through Model H feed mechanism shows arrangement of parts. See text for detailed description of operation

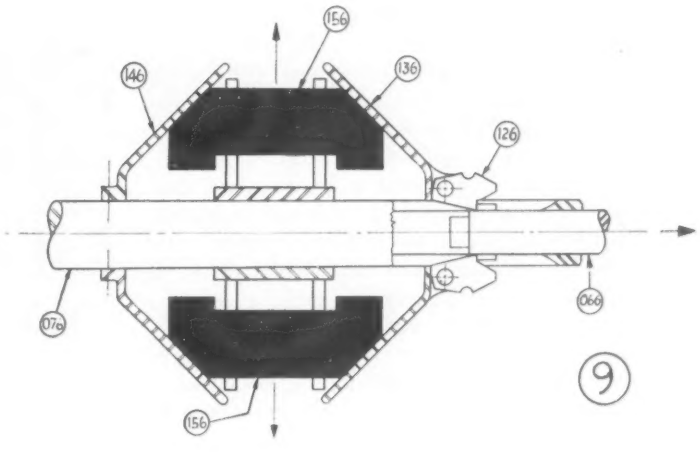


Fig. 9—Simplified schematic diagram to show how outward movement of weights (156) drives cup (136) forward, in turn feeding spindle carrying drill down through work. Compare with Fig. 8 to show the movement

only a small amount of metal is removed in reaming, this work is done almost as fast as the operator can move the fixture from one hole to next. A typical reaming job is that done on ¼-in. thick SAE-1010 steel ring shaped like an oval with outside diameter 12 x 18 in. Rim is ¾-in. wide. After blanking on double acting dies in a large mechanical press, the rings are coined to "break" the cut edge. Then they are drilled, and finally, reamed for precise hole size and finish.

Each piece has 40 holes in it. The operator shown in Fig. 1 reams holes in 550 pieces per 10-hr shift—some 22,000 holes—on this particular type of ring. This amounts to 2200 per hr; that's 36 per min (more than double the rate recommended by the Govro-Nelson Co.) —less than 2 sec per hole, and some of these jobs are done at rate of 3100 per hr, about 31,000 per shift, one operator, one hole at a time. Of course such extremely high outputs are obtained only at a sacrifice in motor life.

Tolerances here are held to plus or minus 0.0015-in. for radial hole center dimension, hole diameter and hole roundness.

Reaming is done without clamping the work in a fixture. As shown in Fig. 1, a guide is located directly underneath the reaming tool and positioned at such a height that the ring can be slid underneath it. To work this setup, the operator simply slides the ring under the guide and against the backup which positions the part radially. If the workman does not position the part perfectly, it will center itself due to the tapered reamer "floating" it into position.

Tapping 980 Holes Per Hour: Fig. 3 shows an automatic head in a setup similar to those in Figs. 1 and 2. But where the heads for drilling and reaming operate at 1700 rpm, the unit for tapping is geared down so that it runs at 700-800 rpm. Of necessity, tapping threads requires a slower tool speed.

A typical operation employs a 10/32-in. tap in working holes in ⅞-in. thick SAE-1010 stock. There are 28 holes per piece in this instance, the operator completing threads in some 350 pieces per 10-hr shift. This amounts to tapping a total of 9800 holes, or an average output

(*Please turn to Page* 154)

HARDENABILITY BAND

. . . set up for 35 more steels

Joint committee of Society of Automotive Engineers and American Iron and Steel Institute add 3 nickel, 2 chromium-nickel, 5 nickel-molybdenum and 25 NE steels to "H" group. Data for complete standard steel list now being prepared. Bands based upon present chemistry will be set up later

TENTATIVE hardenability bands have been worked out and approved for 35 additional steels by the Iron and Steel Committee of the War Engineering Board and the Iron and Steel Division, General Standards Committee, of the Society of Automotive Engineers Inc. and the Technical Committee on Alloy Steel of the American Iron and Steel Institute.

The original list of "H" steels for which hardenability data are available was published in "Contributions to the Metallurgy of Steel—No. 11" in July, 1944 by the joint committee of the two Societies responsible for the work. Included were nine chromium-molybdenum 4100 series steels in various carbon ranges from 0.28 to 0.54 per cent; 26 steels in the chromium-nickel-molybdenum 8600 and 8700 series in carbon ranges from 0.17 to 0.54; chromium-nickel-molybdenum 4340 steel and nickel-molybdenum 4620 steel.

In checking the accompanying table, it will be noted that the new additions to the list include three nickel 2500 series steels in carbon ranges from 0.08 to 0.21 per cent; two chromium-nickel 3300 series steels in carbon ranges from 0.07 to 0.20; two nickel-molybdenum 4300 series steels in carbon ranges from 0.14 to 0.23; nickel-molybdenum 4640 steel, 4815 and 4820; 13 national emergency 9400 series steels; nine 8600 series and three 8700 series steels.

Standard bands based upon modified chemical composition limits are being set up for every steel in the standard steel list. At a later date, a complete series of bands will be worked out for each steel based upon their original compositions.

For the purpose of affording steel producers latitude in manufacturing operations in attempting to meet a common standard of hardenability limits the chemical composition limits have been modified somewhat from ranges or limits applicable to the same steels as specified by chemical composition only. These modifications, however, have not been great enough to influence the general characteristics of the original compositions.

Bands for each of the 35 added steels appear on accompanying pages and are presented to indicate hardness values desired at any particular distance on a standard 1-in. end-quench bar. When making use of hardenability bands for specification purposes, steel users are asked to select two specific points on the curves and not specify the full length of the curve. These two points may be selected in any one of the following ways:

1. The minimum and maximum distances at which any desired hardness value occurs. This is method shown in the chart, "Illustration of Methods of Specifying Requirements", as A-A and could be specified for the curves in the chart as J_{45} equals 4/11 sixteenths.

2. The minimum and maximum hardness values at any desired distances. This method is illustrated in the chart as points B-B and could be specified for the curves as J 36/50 equals 8 sixteenths. Obviously, the distance selected would be that distance on the end-quench test bar which corresponds to the section used by the consumer.

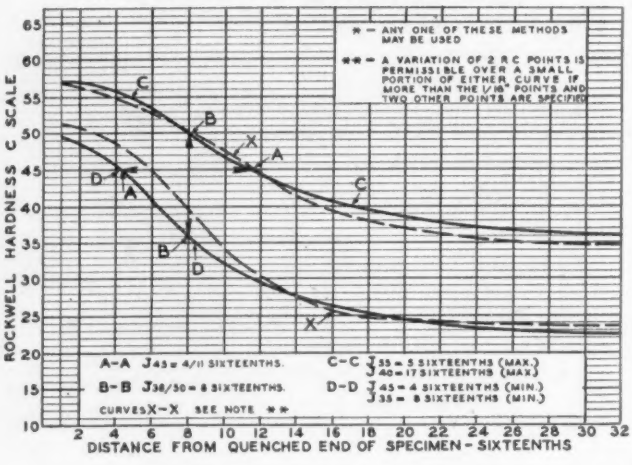
3. Two maximum hardness values at two desired distances as illustrated in the chart as points C-C.

4. Two minimum hardness values at two desired distances as illustrated in the chart as points D-D.

5. Any point on the minimum hardenability curve plus any point on the maximum curve.

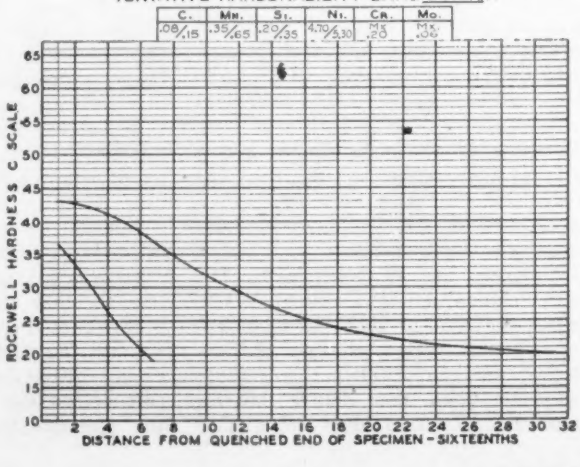
The ranges and limits in the table apply only to material not exceeding 100 sq. in. in cross-sectional area, or 18 in. in width or 7000 lb. in weight, per piece. Neither the modified chemical composition limits nor the hardenability bands apply to any of the flat rolled products, such as sheets, strip, plates or slabs over 18 in. wide.

ILLUSTRATION OF METHODS* OF SPECIFYING REQUIREMENTS


* — ANY ONE OF THESE METHODS MAY BE USED
** — A VARIATION OF 2 R C POINTS IS PERMISSIBLE OVER A SMALL PORTION OF EITHER CURVE IF MORE THAN THE 1/16" POINTS AND TWO OTHER POINTS ARE SPECIFIED
ROCKWELL HARDNESS C SCALE
DISTANCE FROM QUENCHED END OF SPECIMEN - SIXTEENTHS
A-A J45 = 4/11 SIXTEENTHS.
B-B J36/50 = 8 SIXTEENTHS.
CURVES X-X SEE NOTE **
C-C J35 = 5 SIXTEENTHS (MAX.) J40 = 17 SIXTEENTHS (MAX.)
D-D J45 = 4 SIXTEENTHS (MIN.) J35 = 8 SIXTEENTHS (MIN.)

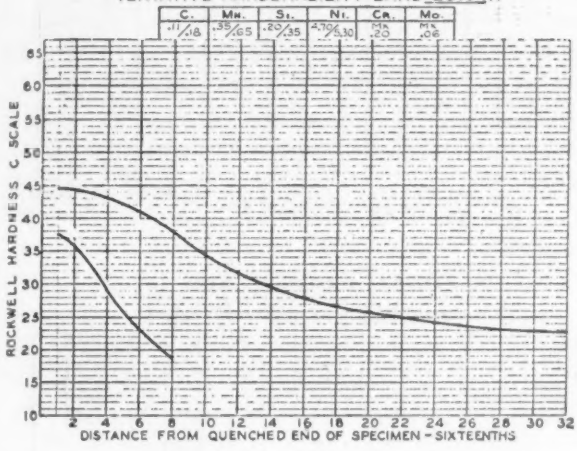
TENTATIVE HARDENABILITY BAND 2512 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.08/.15	.35/.65	.20/.35	4.70/5.30	Mx. .20	Mx. .06



DATA

TENTATIVE HARDENABILITY BAND 2515 H



TENTATIVE HARDENABILITY BAND 2517 H

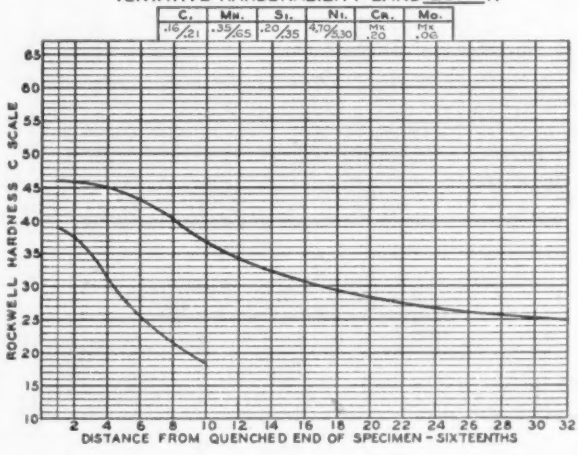


TABLE II

STANDARD PERMISSIBLE VARIATIONS FROM SPECIFIED CHEMICAL RANGES AND LIMITS APPLICABLE TO H STEELS

Element	Limit or maximum of Specified Range	Standard Variation Over or under the Limits Set
	(Per Cent)	
Carbon	All Ranges	0.01
Manganese	To 0.90 incl.	0.03
	Over 0.90 to 2.00 incl.	0.04
Phosphorus		0.005
Sulphur	To 0.060	0.005
	Over 0.060 not subject to check	
Silicon	To 0.35 incl.	0.02
	Over 0.35 to 2.20 incl.	0.05
Copper	To 0.50	0.02
	Over 0.50 to 1.00 incl.	0.05
Nickel	To 1.00 incl.	0.03
	Over 1.00 to 2.00 incl.	0.05
	Over 2.00 to 5.25 incl.	0.07
Chromium	To 0.90 incl.	0.03
	Over 0.90 to 2.10 incl.	0.05
	Over 2.10 to 3.99 incl.	0.10
Molybdenum	To 0.20 incl.	0.01
	Over 0.20 to 0.40 incl.	0.02
	Over 0.40 to 0.60 incl.	0.03
	Over 0.60 to 1.00 incl.	0.05
Tungsten	To 1.00 incl.	0.05
	Over 1.00 to 4.00 incl.	0.10
Vanadium	To 0.50	0.03

TABLE I

H STEEL SERIES

These steels, available in electric furnace or open hearth grades in blooms, billets and bars, may be specified on the basis of hardenability bands. Ranges and limits which follow apply only to material not exceeding 100 sq. in. in cross-sectional area, or 18 in. in width, or 7000 lb in weight, per piece as the total product of the ingot, and excludes all plates, shapes, sheet, strip and slabs.

Steel Designation

SAE or	Chemical Composition, per cent C	Mn	Si	Ni	Cr	Mo
AISI 2512H*	0.08-0.15	0.35-0.65	0.20-0.35	4.70-5.30	Max.0.20	Max.0.06
AISI 2515H*	0.11-0.18	0.35-0.65	0.20-0.35	4.70-5.30	Max.0.20	Max.0.06
AISI 2517H*	0.16-0.21	0.35-0.65	0.20-0.35	4.70-5.30	Max.0.20	Max.0.06
AISI 3310H*	0.07-0.14	0.35-0.65	0.20-0.35	3.20-3.80	1.35-1.75	Max.0.06
AISI 3316H*	0.13-0.20	0.35-0.65	0.20-0.35	3.20-3.80	1.35-1.75	Max.0.06
AISI 4120H	0.27-0.34	0.25-0.65	0.20-0.35	.....	0.80-1.15	0.15-0.25
AISI 4130H	0.30-0.37	0.25-0.65	0.20-0.35	.....	0.80-1.15	0.15-0.25
AISI 4135H	0.32-0.39	0.60-0.95	0.20-0.35	.....	0.80-1.15	0.15-0.25
AISI 4137H	0.35-0.43	0.60-0.95	0.20-0.35	.....	0.80-1.15	0.15-0.25
AISI 4140H	0.37-0.45	0.70-1.05	0.20-0.35	.....	0.80-1.15	0.15-0.25
AISI 4142H	0.40-0.48	0.70-1.05	0.20-0.35	.....	0.80-1.15	0.15-0.25
AISI 4145H	0.42-0.50	0.70-1.05	0.20-0.35	.....	0.80-1.15	0.15-0.25
AISI 4147H	0.44-0.52	0.70-1.05	0.20-0.35	.....	0.80-1.15	0.15-0.25
AISI 4150H	0.46-0.54	0.70-1.05	0.20-0.35	.....	0.80-1.15	0.15-0.25
AISI 4317H*	0.14-0.21	0.40-0.70	0.20-0.35	1.50-2.00	0.35-0.65	0.20-0.30
AISI 4320H*	0.16-0.23	0.40-0.70	0.20-0.35	1.50-2.00	0.35-0.65	0.20-0.30
AISI 4340H	0.37-0.45	0.60-0.95	0.20-0.35	1.50-2.00	0.65-0.95	0.20-0.30
AISI 4620H	0.17-0.24	0.40-0.70	0.20-0.35	1.50-2.00	.....	0.20-0.30
AISI 4640H*	0.37-0.45	0.55-0.85	0.20-0.35	1.50-2.00	Max.0.20	0.20-0.30
AISI 4815H*	0.12-0.19	0.35-0.65	0.20-0.35	3.20-3.80	Max.0.20	0.20-0.30
AISI 4820H*	0.17-0.24	0.45-0.75	0.20-0.35	3.20-3.80	Max.0.20	0.20-0.30
NE...8613H*	0.09-0.16	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8615H*	0.11-0.18	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8617H*	0.14-0.21	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8620H	0.17-0.24	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8622H	0.20-0.27	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8625H	0.22-0.29	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8627H	0.25-0.32	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8630H	0.27-0.34	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8632H	0.30-0.37	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8635H	0.32-0.39	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8637H	0.35-0.43	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8640H	0.37-0.45	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8642H	0.40-0.48	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8645H	0.42-0.50	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8647H	0.44-0.52	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8650H	0.46-0.54	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8652H*	0.48-0.58	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8655H*	0.50-0.60	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8657H*	0.52-0.62	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8660H*	0.55-0.65	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8662H*	0.57-0.67	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8665H*	0.60-0.70	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.15-0.25
NE...8713H*	0.09-0.16	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...8715H*	0.11-0.18	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...8717H*	0.14-0.21	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...8720H	0.17-0.24	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...8722H	0.20-0.27	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...8725H	0.22-0.29	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...8727H	0.25-0.32	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...8730H	0.27-0.34	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...8732H	0.30-0.37	0.60-0.95	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...8735H	0.32-0.39	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...8737H	0.35-0.43	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...8740H	0.37-0.45	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...8742H	0.40-0.48	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...8745H	0.42-0.50	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...8747H	0.44-0.52	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...8750H	0.46-0.54	0.70-1.05	0.20-0.35	0.35-0.75	0.35-0.65	0.20-0.30
NE...9420H*	0.17-0.24	0.80-1.15	0.20-0.35	0.25-0.65	0.25-0.55	0.08-0.15
NE...9422H*	0.20-0.27	0.80-1.15	0.20-0.35	0.25-0.65	0.25-0.55	0.08-0.15
NE...9425H*	0.22-0.29	0.80-1.15	0.20-0.35	0.25-0.65	0.25-0.55	0.08-0.15
NE...9427H*	0.25-0.32	0.80-1.15	0.20-0.35	0.25-0.65	0.25-0.55	0.08-0.15
NE...9430H*	0.27-0.34	0.85-1.25	0.20-0.35	0.25-0.65	0.25-0.55	0.08-0.15
NE...9432H*	0.30-0.37	0.85-1.25	0.20-0.35	0.25-0.65	0.25-0.55	0.08-0.15
NE...9435H*	0.32-0.39	0.85-1.25	0.20-0.35	0.25-0.65	0.25-0.55	0.08-0.15
NE...9437H*	0.35-0.43	0.85-1.25	0.20-0.35	0.25-0.65	0.25-0.55	0.08-0.15
NE...9440H*	0.37-0.45	0.85-1.25	0.20-0.35	0.25-0.65	0.25-0.55	0.08-0.15
NE...9442H*	0.40-0.48	0.95-1.35	0.20-0.35	0.25-0.65	0.25-0.55	0.08-0.15
NE...9445H*	0.42-0.50	0.95-1.35	0.20-0.35	0.25-0.65	0.25-0.55	0.08-0.15
NE...9447H*	0.44-0.52	1.15-1.55	0.20-0.35	0.25-0.65	0.25-0.55	0.08-0.15
NE...9450H*	0.46-0.54	1.15-1.55	0.20-0.35	0.25-0.65	0.25-0.55	0.08-0.15

Note 1—Phosphorus and sulphur on open hearth steel to be 0.040 per Phosphorus and sulphur on electric furnace steel to be 0.025 per cent Mx. each.

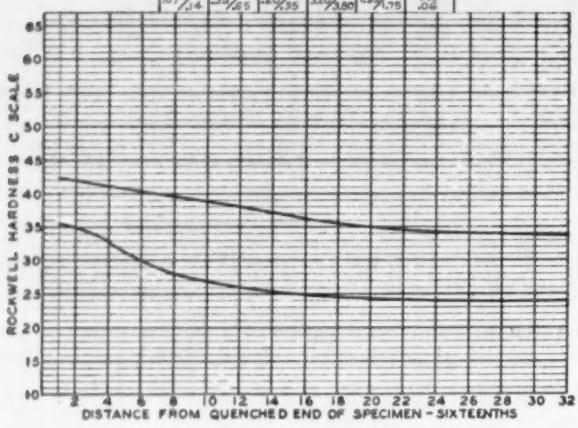
Note 2—Small quantities of certain elements may be found in alloy steel which are not specified or required. These elements are to be considered as incidental and acceptable to the following maximum amounts: Copper 0.35 per cent; Nickel 0.25 per cent; Chromium, 0.20 per cent; Molybdenum, 0.06 per cent.

Note 3—The chemical ranges and limits shown in Table I are subject to the standard permissible variations for check analysis shown in Table II.

Note 4—NE denotes National Emergency Standard Steel.
*New H steels.

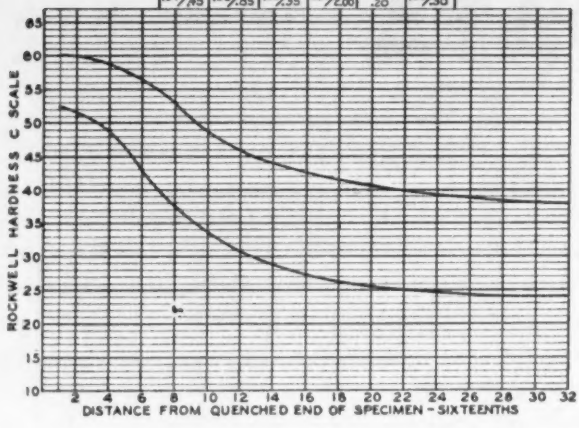
TENTATIVE HARDENABILITY BAND 3310 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.07/.14	.35/.65	.20/.35	3.20/3.80	1.35/1.75	Max .06



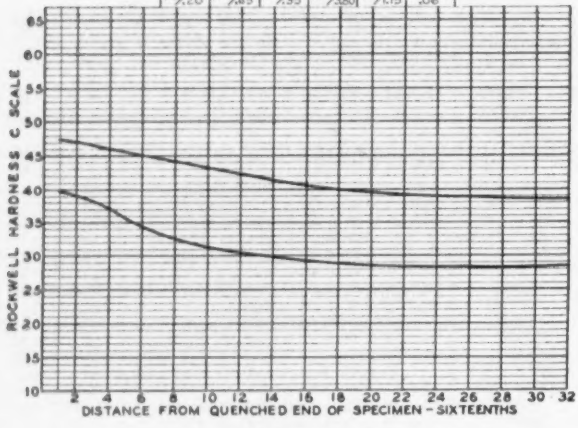
TENTATIVE HARDENABILITY BAND 4640 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.37/.45	.55/.85	.20/.35	1.50/2.00	Max .20	.20/.30



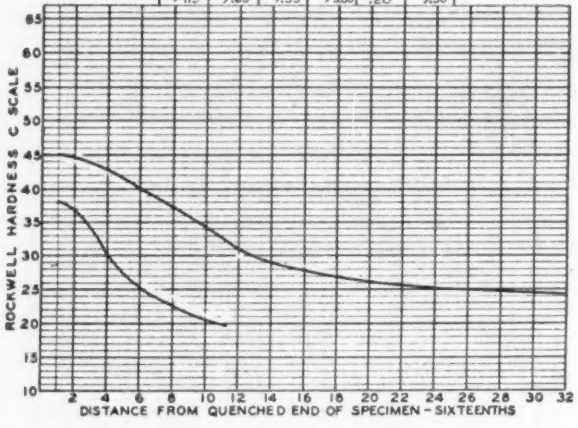
TENTATIVE HARDENABILITY BAND 3316 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.13/.20	.35/.65	.20/.35	3.20/3.80	1.35/1.75	Max .06



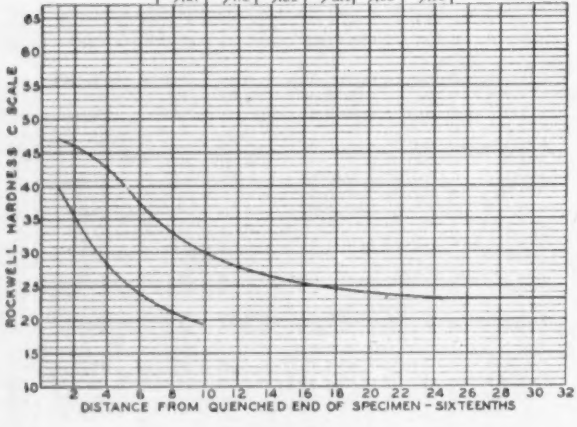
TENTATIVE HARDENABILITY BAND 4815 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.12/.19	.35/.65	.20/.35	3.20/3.80	Max .20	.20/.30



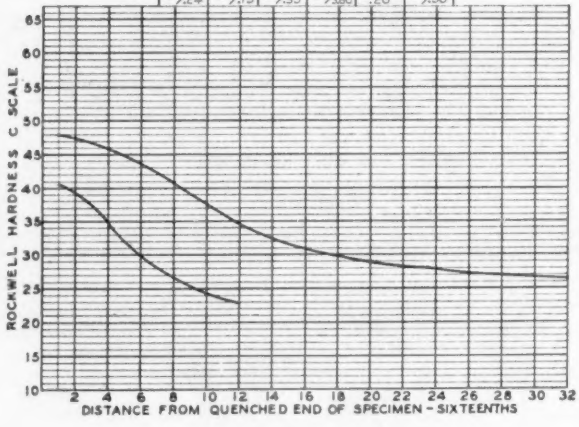
TENTATIVE HARDENABILITY BAND 4317 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.14/.21	.40/.70	.20/.35	1.50/2.00	.35/.65	.20/.30



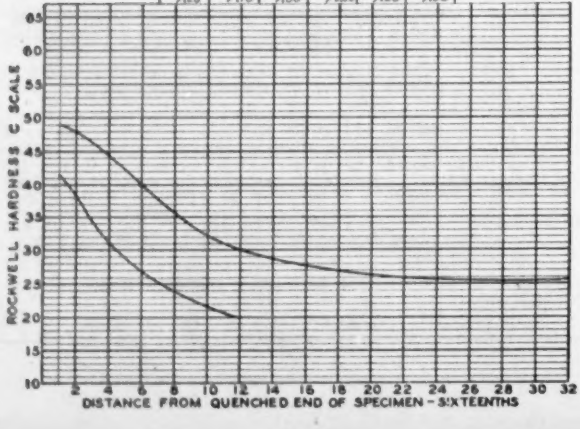
TENTATIVE HARDENABILITY BAND 4820 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.17/.24	.45/.75	.20/.35	3.20/3.80	Max .20	.20/.30



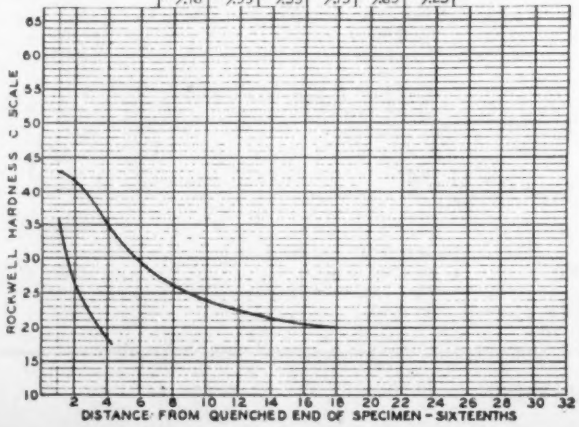
TENTATIVE HARDENABILITY BAND 4320 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.16/.23	.40/.70	.20/.35	1.50/2.00	.35/.65	.20/.30



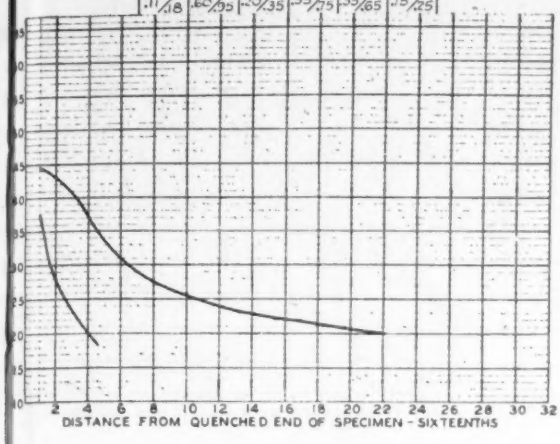
TENTATIVE HARDENABILITY BAND 8613 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.09/.16	.60/.95	.20/.35	.35/.75	.35/.65	.15/.25



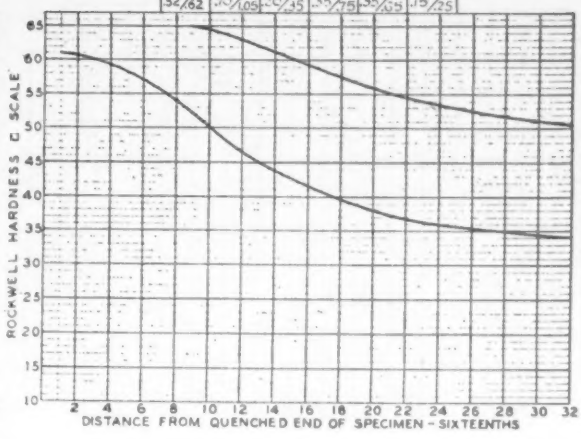
TENTATIVE HARDENABILITY BAND 8615 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.11/.18	.60/.95	.20/.35	.35/.75	.35/.65	.15/.25



TENTATIVE HARDENABILITY BAND 8657 H

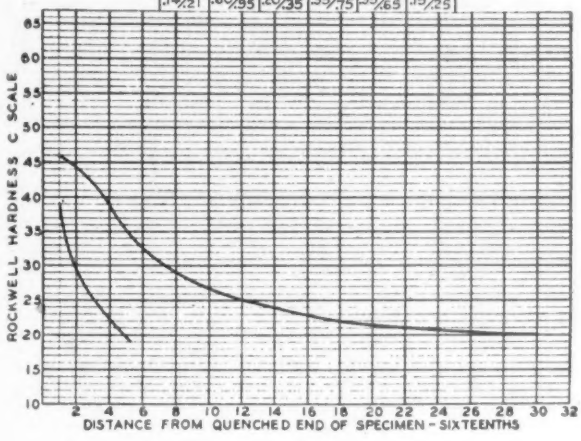
C.	Mn.	Si.	Ni.	Cr.	Mo.
.52/.62	.70/1.05	.20/.35	.35/.75	.35/.65	.15/.25



Hardenability BAND DATA

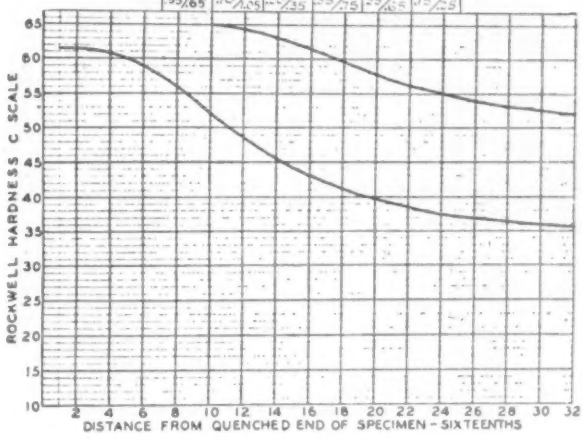
TENTATIVE HARDENABILITY BAND 8617 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.14/.21	.60/.95	.20/.35	.35/.75	.35/.65	.15/.25



TENTATIVE HARDENABILITY BAND 8660 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.55/.65	.70/1.05	.20/.35	.35/.75	.35/.65	.15/.25

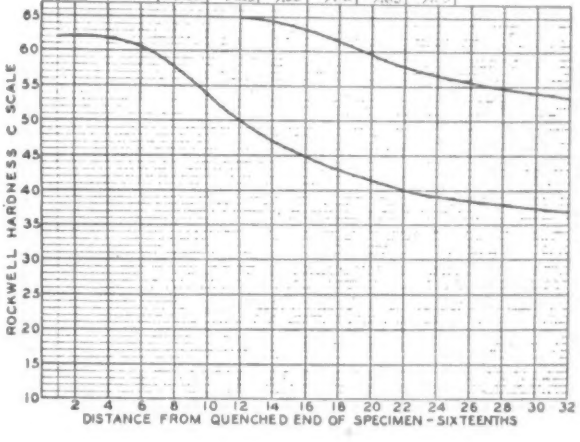


TENTATIVE HARDENABILITY BAND 8652 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.48/.58	.70/1.05	.20/.35	.35/.75	.35/.65	.15/.25

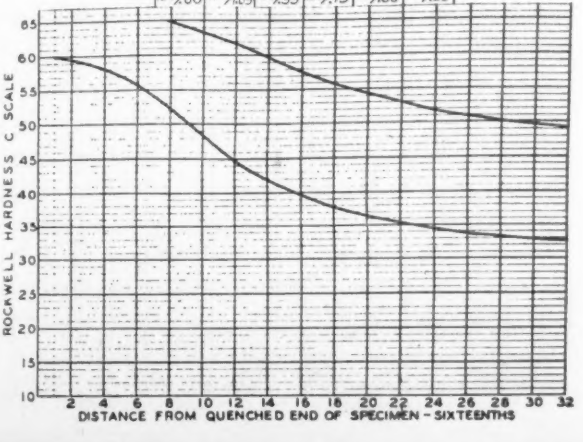
TENTATIVE HARDENABILITY BAND 8662 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.57/.67	.70/1.05	.20/.35	.35/.75	.35/.65	.15/.25



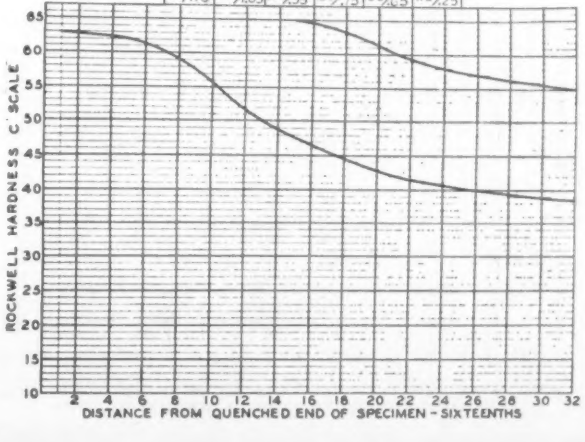
TENTATIVE HARDENABILITY BAND 8655 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.50/.60	.70/1.05	.20/.35	.35/.75	.35/.65	.15/.25



TENTATIVE HARDENABILITY BAND 8665 H

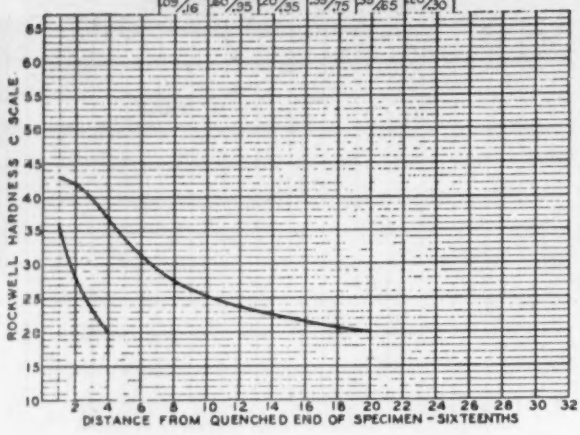
C.	Mn.	Si.	Ni.	Cr.	Mo.
.60/.70	.70/1.05	.20/.35	.35/.75	.35/.65	.15/.25



Hardenability BAND DATA

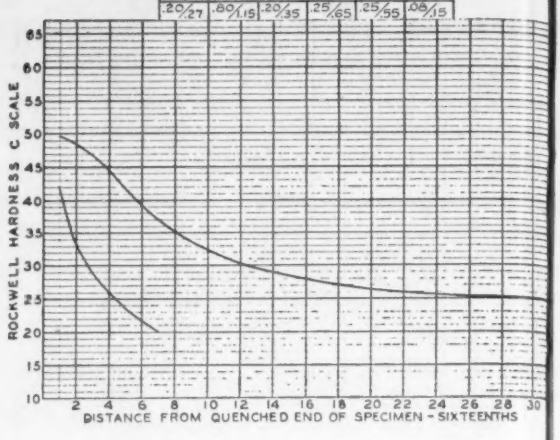
TENTATIVE HARDENABILITY BAND 8713 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.09/.16	.60/.95	.20/.35	.35/.75	.35/.65	.20/.30



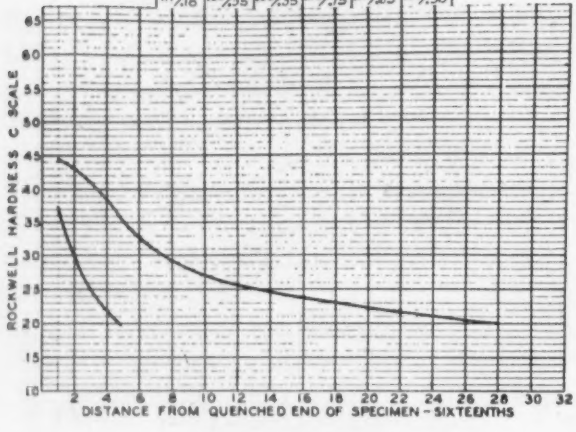
TENTATIVE HARDENABILITY BAND 9422 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.20/.27	.80/1.15	.20/.35	.25/.65	.25/.55	.08/.15



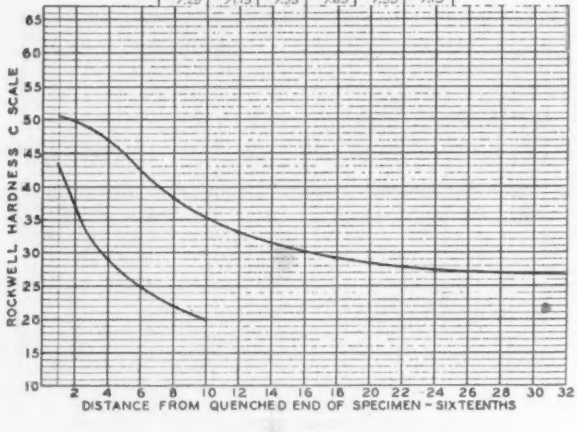
TENTATIVE HARDENABILITY BAND 8715 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.11/.18	.60/.95	.20/.35	.35/.75	.35/.65	.20/.30



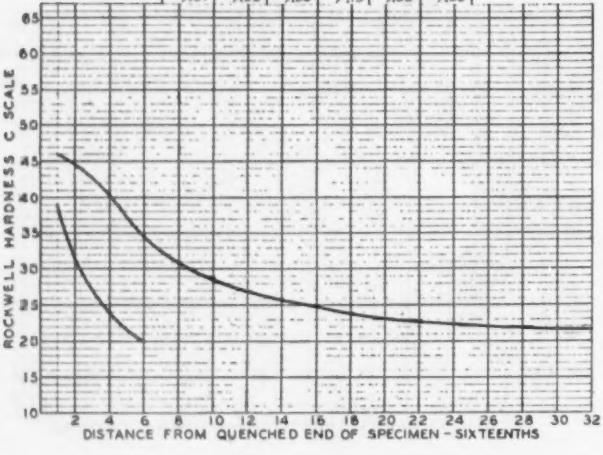
TENTATIVE HARDENABILITY BAND 9425 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.22/.28	.80/1.15	.20/.35	.25/.65	.25/.55	.08/.15



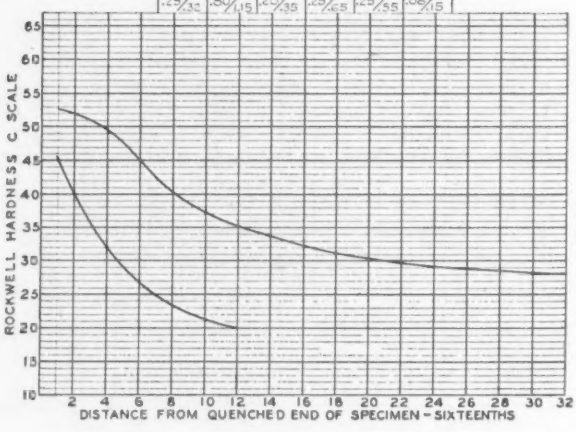
TENTATIVE HARDENABILITY BAND 8717 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.14/.21	.60/.95	.20/.35	.35/.75	.35/.65	.20/.30



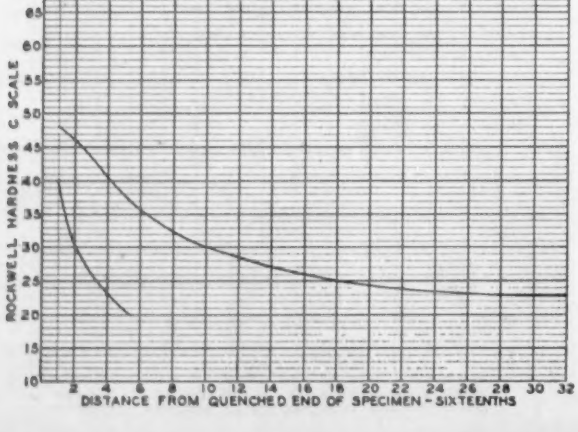
TENTATIVE HARDENABILITY BAND 9427 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.25/.32	.80/1.15	.20/.35	.25/.65	.25/.55	.08/.15



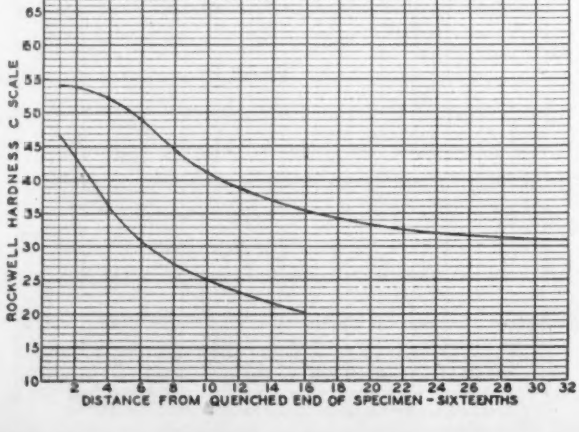
TENTATIVE HARDENABILITY BAND 9420 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.17/.24	.80/1.15	.20/.35	.25/.65	.25/.55	.08/.15



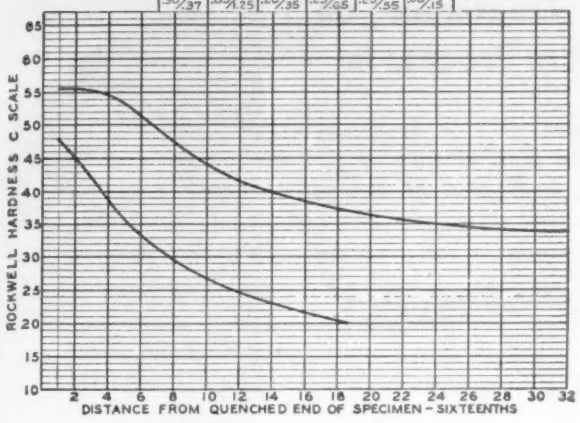
TENTATIVE HARDENABILITY BAND 9430 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.27/.34	.85/1.25	.20/.35	.25/.65	.25/.55	.08/.15



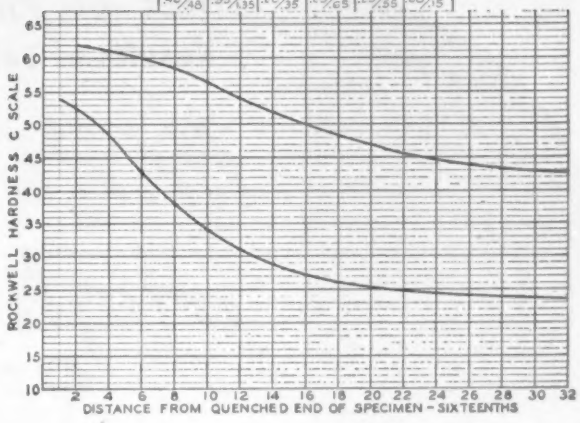
TENTATIVE HARDENABILITY BAND 9432 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.30/.37	.85/1.25	.20/.35	.25/.65	.25/.55	.08/.15



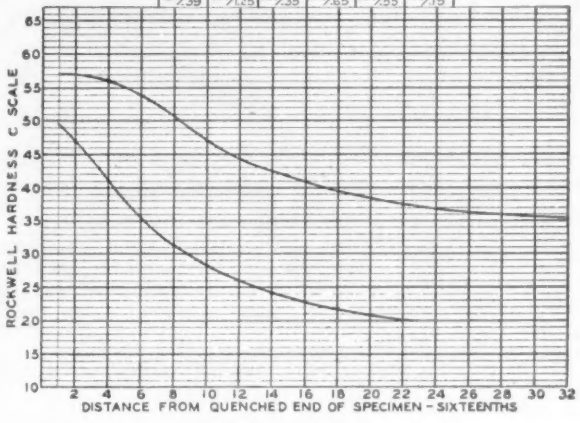
TENTATIVE HARDENABILITY BAND 9442 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.40/.48	.95/1.35	.20/.35	.25/.65	.25/.55	.08/.15



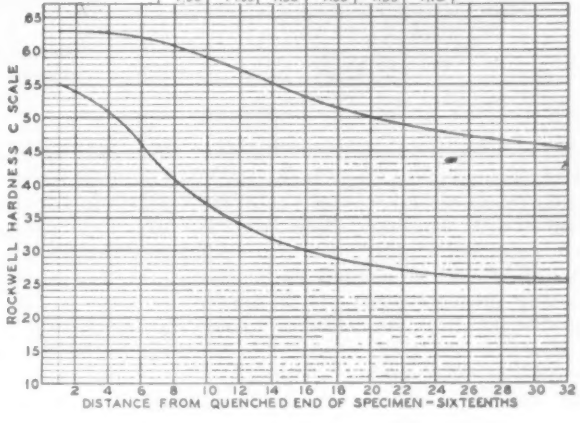
TENTATIVE HARDENABILITY BAND 9435 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.32/.39	.85/1.25	.20/.35	.25/.65	.25/.55	.08/.15



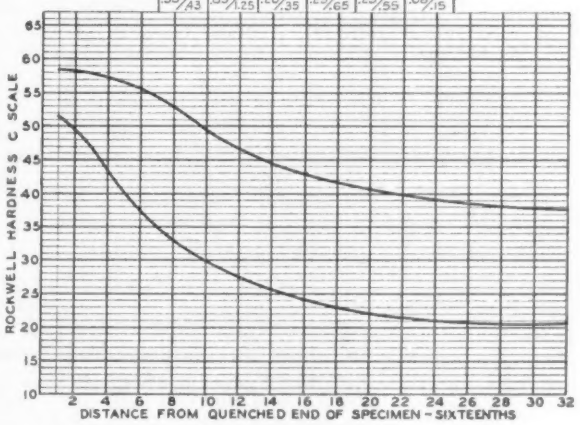
TENTATIVE HARDENABILITY BAND 9445 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.42/.50	.95/1.35	.20/.35	.25/.65	.25/.55	.08/.15



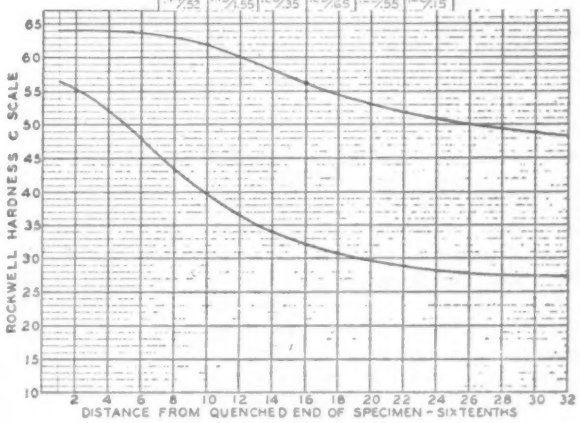
TENTATIVE HARDENABILITY BAND 9437 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.35/.43	.85/1.25	.20/.35	.25/.65	.25/.55	.08/.15



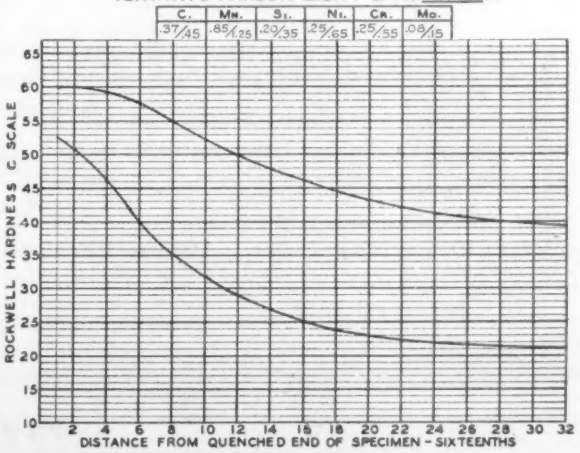
TENTATIVE HARDENABILITY BAND 9447 H

C.	Mn.	Si.	Ni.	Cr.	Mo.
.44/.52	1.15/1.55	.20/.35	.25/.65	.25/.55	.08/.15



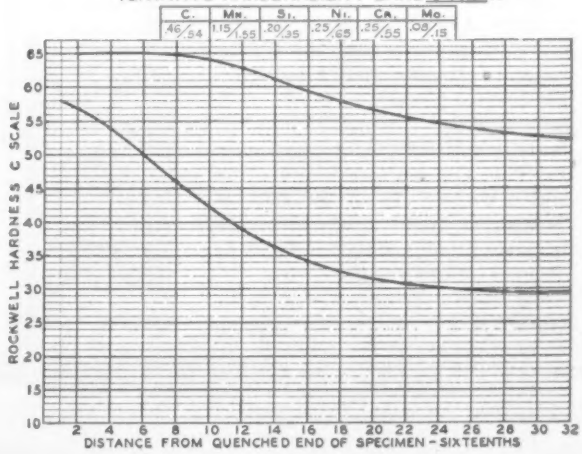
TENTATIVE HARDENABILITY BAND 9440 H

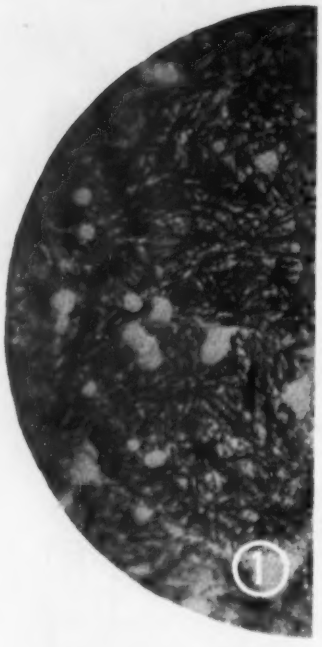
C.	Mn.	Si.	Ni.	Cr.	Mo.
.37/.45	.85/1.25	.20/.35	.25/.65	.25/.55	.08/.15



TENTATIVE HARDENABILITY BAND 9450 H

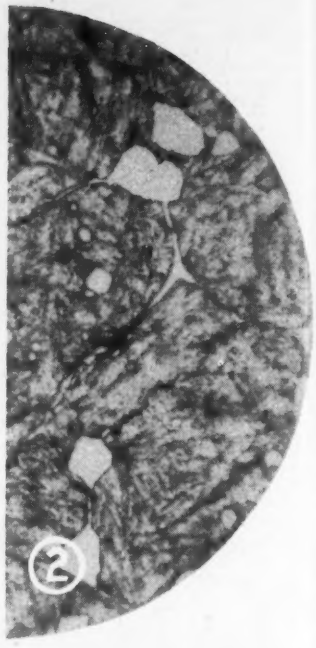
C.	Mn.	Si.	Ni.	Cr.	Mo.
.46/.54	1.15/1.55	.20/.35	.25/.65	.25/.55	.08/.15





Effect of Prior Treatment on Results of Sub-Zero Process in

HARDENING High-Speed Steel



By STEWART M. DePOY
Metallurgist
Delco Products Division
General Motors Corp.
Dayton, O.

ALL investigators have found that the sub-zero treatment for high speed steels definitely increases the productive life of a cutting tool. However, there is some difference of opinion as to the place refrigeration should be inserted during the hardening process. Some say it should come directly after the quench, and some say after the first temper.

Regardless of the time of refrigeration, it has been found that the effect is about the same, i.e., different investigators using different routings for their tools will obtain similar results. Since nearly all hardening temperatures and soaking times will vary between different industrial plants, it is suggested that this fact may be the reason for obtaining the same results by different routings. It is believed that the refrigeration is very sensitive to this prior treatment.

For primary investigation, as reported also in *Production Data*, published by E. F. Houghton & Co., Philadelphia, the author selected tool bits made from GM-M2 steel with the following analysis: Carbon, 0.84; manganese, 0.32; chromium, 4.00; tungsten, 5.28; molybdenum, 4.26; and vanadium, 1.72. The following treatments were used:

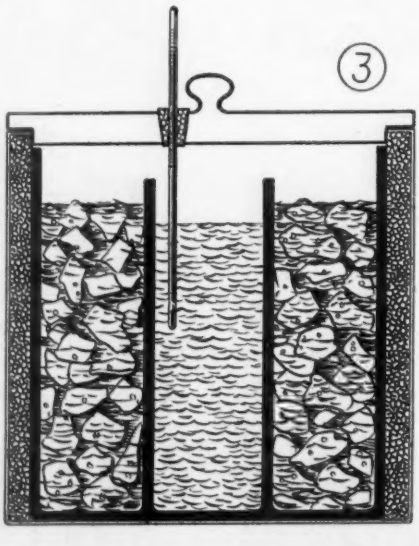
1. Preheat at 1600° F. Austenitize at 2225° F. Quench in salt at 1050° F and cool in air to 100-150° F. Double temper at 1050° F, 2 hr each temper.
2. Preheat at 1600° F. Austenitize at 2225° F. Quench in salt at 1050° F and cool in air to 100-150° F. Refrigerate at minus 100° F for 3 hr. Double temper at 1050° F, 2 hr each temper.
3. Preheat at 1600° F. Austenitize at 2225° F. Quench in salt at 1050° F and cool in air to 100-150° F. Temper at 1050° F for 2 hr. Refrigerate at minus 100° F for 3 hr. Temper at 1050° F for 2 hr.
4. Same as No. 1, except the double temper is followed by refrigeration at minus 100° F for 3 hr.

A battery of Ajax high-speed furnaces was used for the treatment. Houghton's Liquid Heat N. D. and Liquid Heat 2400C were used in the preheat and high heat baths, respectively. Liquid heat quench salt was used in the quench bath. The tempering was done in a Homo furnace, and the refrigeration was accomplished by placing the parts in a mixture of dry ice and methanol, which mixture was in turn placed in a refrigeration unit operating at minus 60° F.

The bits were tested on a dry lathe operation, which reduced the diameter of a large aircraft tubing of AMS 6380 steel having a rockwell hardness of 38-42C. Results obtained are as follows:

Treatment	Av. Production Per Grind	Productivity Increase
1	5.7	average
2	6.7	17.5%
3	8.3	45.7%
4	7.5	31.5%

It is obvious that the No. 3 treatment gives the best results in the case. Following this test, some circular form tools out of GM-M2 material were tested. However, treatment No. 2 was omitted due to the cracking hazard involved. Results obtained on the form tools were as follows:



Treatment	Av. Production Per Grind	Productivity Increase
1	1780	average
3	2750	54.5%
4	2000	12.5%

Again No. 3 treatment stands out above the other two.

From examination of the photomicrographs, Figs. 1 and 2, it was discovered that an entirely different structure is obtained when the steel is refrigerated. Not only is the transformation of austenite more complete, but the martensite formed has a much finer appearance than that present in the double tempered unrefrigerated tool. (Subsequent examinations of the microsections by the author and other metallurgists reveal that this altered appearance may have been due to some extent to differential etching.) It is believed that this is due to the tremendous internal pressures which are set up inside the tool at minus 110°F. Although Izod tests show the impact resistance of the super-cooled tool to be less than that of the standard treated one (27 ft lb against 32 ft lb), it has been found that the cutting edge of the refrigerated tool does not chip, whereas this latter phenomenon is very prevalent on standard treated tools.

The sub-zero treatment is not limited to high speed steel alone. It has been used for a great many years on gages to complete the austenite transformation. It may be used to an advantage on many nonferrous metals, and some investigation is now being carried on to determine its effect on plastics. The low alloy steels and nonferrous metals only require about minus 60° F cold intensity. Tests have proven that the complex high alloy steels require minus 100° F or lower before any appreciable results may be obtained. Refrigeration of tools during the hardening treatment is giving phenomenal results.

(*Please turn to Page* 163)

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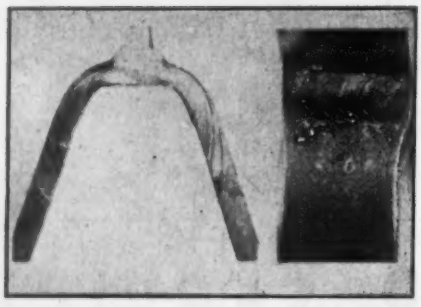
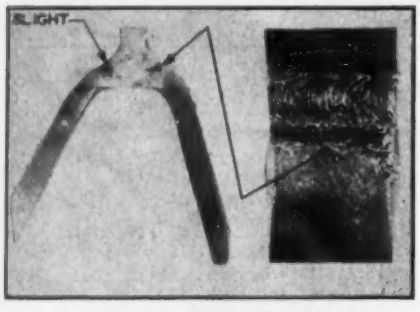
TESTING WELDED STRUCTURES by the tee-bend test

Performance of the toes of fillet welds under severe concentrations of stress in the tee joint is studied in the laboratory by an improved tee-bend test which simulates severe conditions such as encountered by welded ships

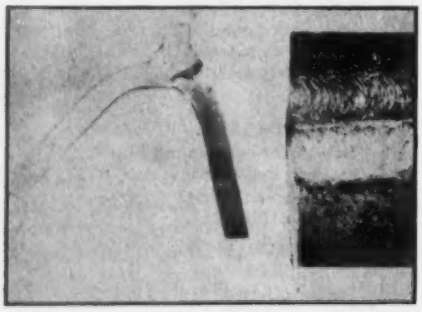
By LEON C. BIBBER
Welding Engineer
Carnegie-Illinois Steel Corp.
Pittsburgh
and
JULIUS HEUSCHKEL
Research Engineer
Westinghouse Electric Corp.
East Pittsburgh, Pa.



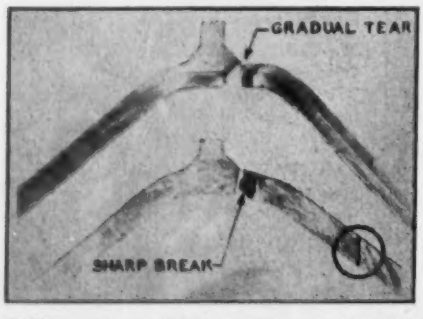
TYPE O: NO FAILURE OF ANY KIND



TYPE 1: PARTIAL TEAR ABOUT PARALLEL TO WELD BOND OR HEAT AFFECTED ZONE, DOES NOT TURN DOWN ACROSS PLATE



TYPE 2: PROGRESSIVE, INCOMPLETE TEARING ACROSS PLATE



TYPE 3: COMPLETE FAILURE ACROSS PLATE

TEE-BEND test as used by the Navy Department was designed to provide a measure of the distortion or abuse that a welded ship structure could endure when subjected to extreme damage such as would result from grounding, collision, torpedo and mine explosions, etc. Continuous member of the tee represents shell plating and stem of the tee simulates internal framing, bulkheads, etc. If the framing or bulkheads of a welded ship crumple so that severe bending tension obtained at the toes of the fillet welds and the shell plating remains intact or does not crack completely through so as to violate the watertight integrity of the ship, the performance of that structure is considered successful.

This test first attracted attention as "The Tee-Bend Test To Compare the Welding Quality of Steels", an article by George A. Ellinger, A. G. Bissell and Morgan L. Williams, in *The Welding Journal Research Supplement*, March, 1942. It was selected as a measure of performance because it simulates conditions described, i.e., it subjects the toes of the fillet welds to severe concentrations of stress and uses an actual welded joint; in fact, the toe is the most used joint in shipbuilding.

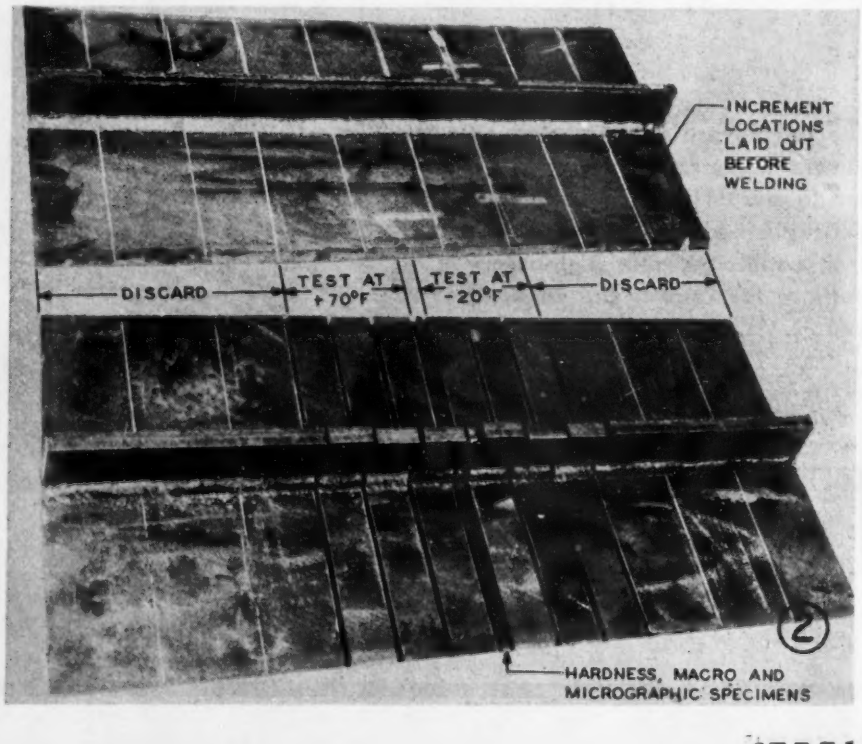
Apparatus: The bending apparatus consists of a series of jigs, which force the specimen through an angle of 120°, and the maximum load, the angle at that load and the type of fracture are noted. The angle at any deflection is determined from a curve. The tee-bend test as practiced by the Navy Department required the specimen to bend to a total angle of 120°. The angle at maximum load is required to be 60°. The four types of fracture seen in Fig. 1, are:

Type 0—No failure of any kind (satisfactory).

Type 1—Tearing back along the bond

Fig. 1—Types of failure occurring in tee-bend specimens

Fig. 2—Specimens and discards which were machined from joint in ½-inch plate



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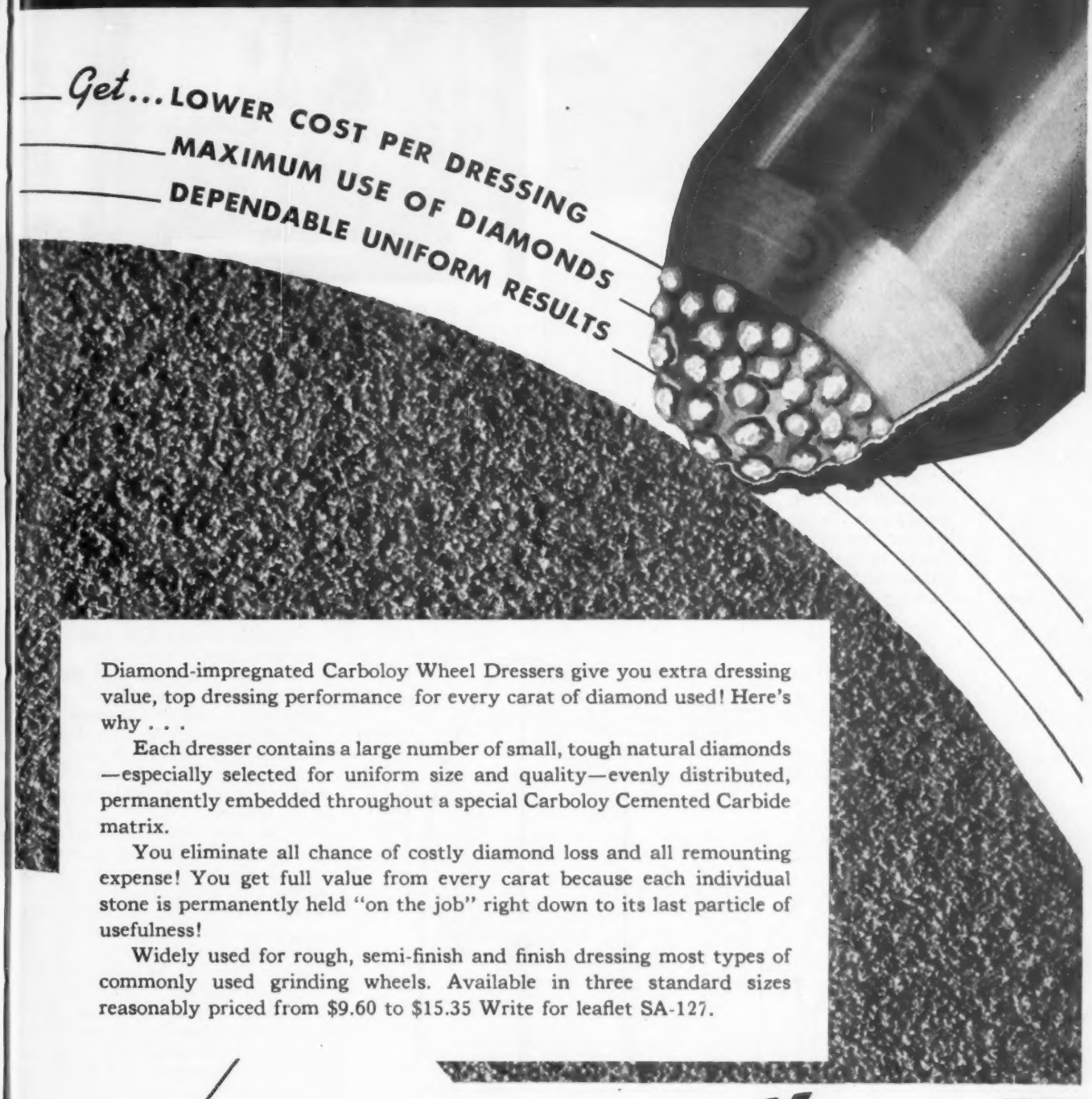

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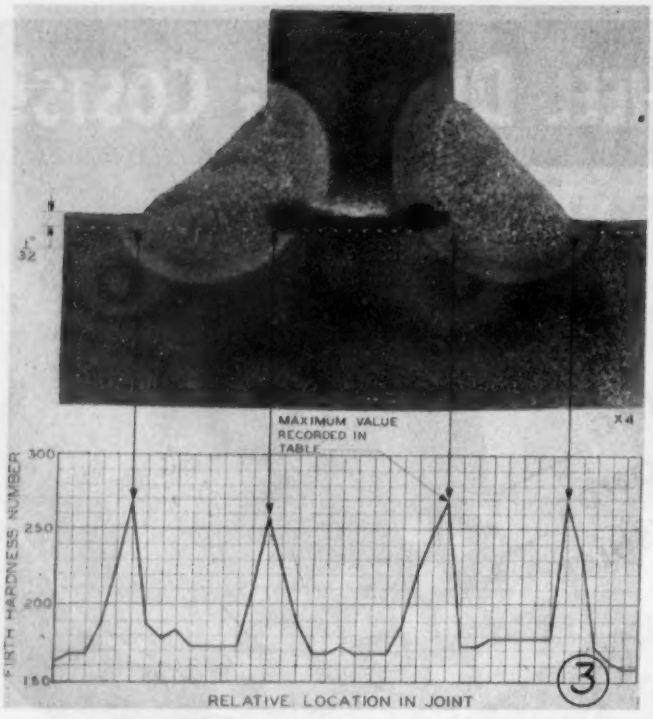


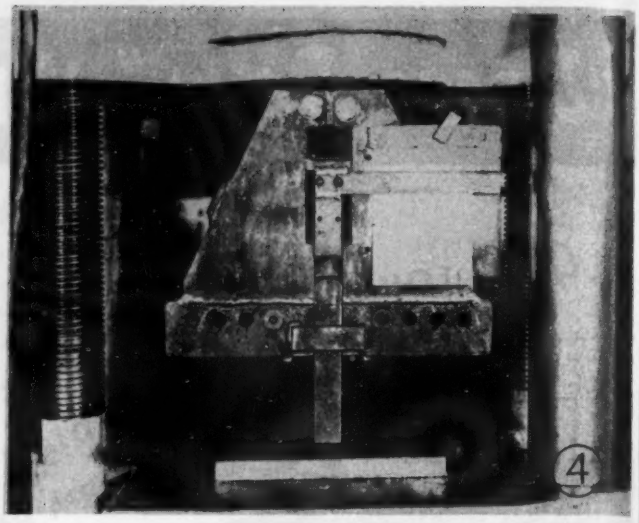


Fig. 3—Method of hardness testing

Fig. 4—Jig for ½, ¾, 1 and 1¼-inch tee-bend tests

but not into the base metal (satisfactory).

Type 2—Tearing into the base metal but not progressing completely through the member (satisfactory).

Type 3—Cracking or tearing completely through the member either rapidly or slowly (unsatisfactory).

Maximum vickers hardness of the base metal also is noted.

Much experience with this test has indicated that, as used by the Navy Department, it has some deficiencies:

(a) Nominal weld size used is one-half the plate thickness. Tolerance on the size gage is plus 1/16-in. This is a variation of 25 per cent in size and 53 per cent in volume for 1/2-in. plates. This tolerance is not sufficiently accurate for research testing.

(b) The exact angle at which failure starts is difficult to determine accurately.

(c) Angle at maximum load is difficult to determine accurately.

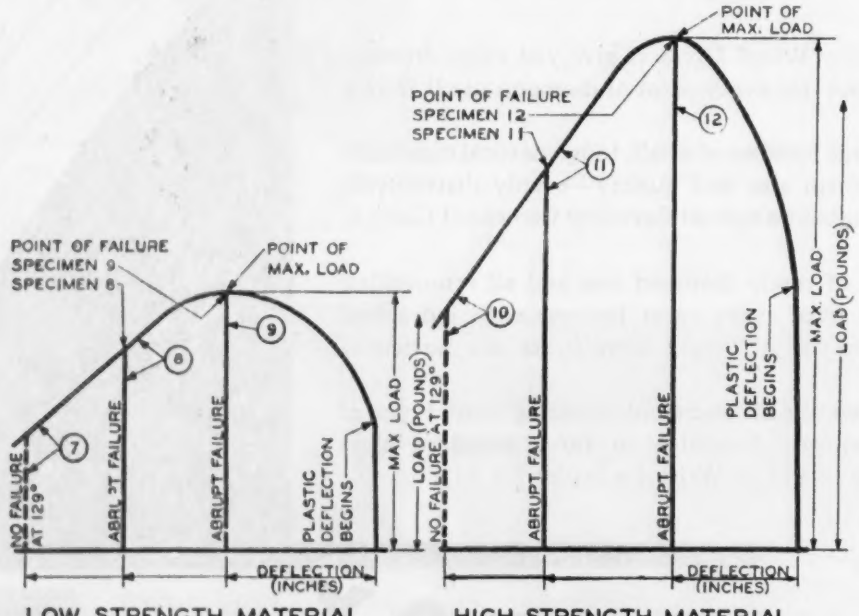
(d) Exact classification of the type of fracture is often difficult and is sometimes a matter of opinion.

(e) Classification of a steel as unsatisfactory for the reason that a sudden complete failure occurred after a large angle of bend had been reached is questionable.

(f) Another factor which enters into the problem but is not taken into account in the tee-bend test as now used by the Navy is the strength of the base metal. Ability to absorb energy during deformation is a function not only of distance but also of force. In designing structures to absorb energy, both are important.

Deformation Energy: In view of this factor, a modification of the test involving energy measurement has been developed by the authors during the past few years. It is tentatively called "the welded tee-bend-energy test." A large amount of work has been done with the 1/2-in. thickness. Work on the 1/4-in. and lesser thicknesses has barely started and little work has been done on thicknesses greater than 1/2-in. However, sufficient promise is seen in the 1/2-in. results thus far obtained to warrant a presentation of the method, together with

(*Please turn to Page* 164)



LOW STRENGTH MATERIAL
(U.T.S. ABT. 42,000 PSI)
EXAMPLES 7,8,& 9.

HIGH STRENGTH MATERIAL
(U.T.S. ABT. 84,000 PSI)
EXAMPLES 10,11,& 12.

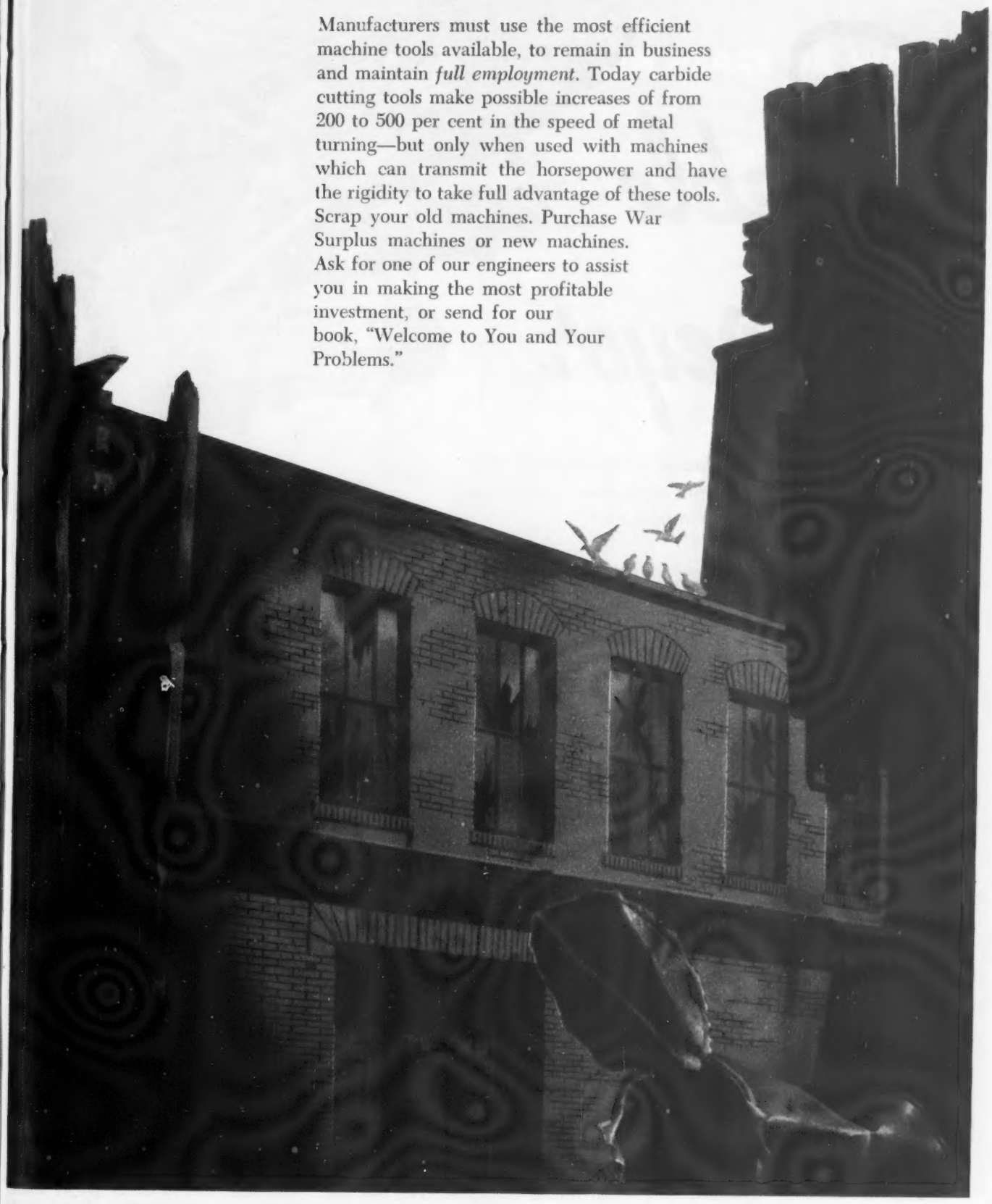
EXAMPLE NO.	MAX. LOAD (LBS)	ANGLE AT MAX. LOAD (DEG)	LOAD AT FAILURE OR JIG CAPACITY (LBS)	ANGLE AT FAILURE OR JIG CAPACITY (DEG)	TYPE OF FAILURE	ENERGY ABSORBED (INCH-LBS)	COMPARISON WITH ENERGY OF STD MILD STEEL
(7)	4300	66	1900	129	NONE	9800	74%
(8)	4300	66	3300	107	ABRUPT-COMPLETE	7700	58%
(9)	4300	66	4300	66	ABRUPT-COMPLETE	4600	35%
(10)	8100	56	4000	129	NONE	19400	147%
(11)	8400	56	6200	107	ABRUPT-COMPLETE	15300	116%
(12)	8400	56	8400	56	ABRUPT-COMPLETE	7200	55%

(5)

Fig. 5—Examples of materials absorbing unequal amounts of energy but sustaining equal maximum loads at the same deflection

COSTS WILL MAKE THE DIFFERENCE

Manufacturers must use the most efficient machine tools available, to remain in business and maintain *full employment*. Today carbide cutting tools make possible increases of from 200 to 500 per cent in the speed of metal turning—but only when used with machines which can transmit the horsepower and have the rigidity to take full advantage of these tools. Scrap your old machines. Purchase War Surplus machines or new machines. Ask for one of our engineers to assist you in making the most profitable investment, or send for our book, "Welcome to You and Your Problems."



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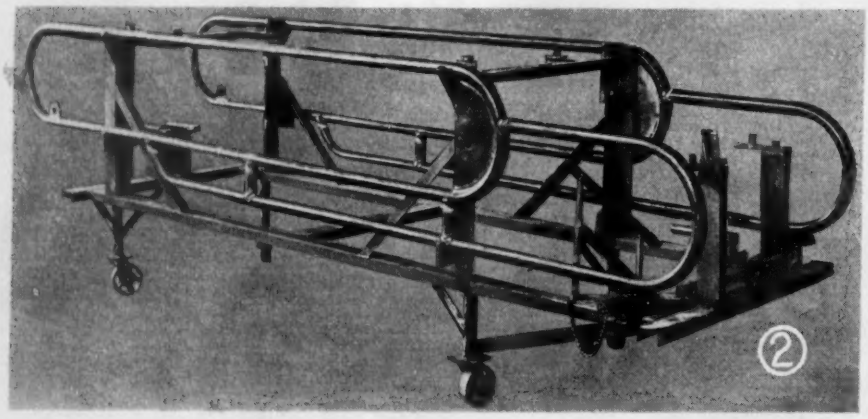
Portable Conveyor

①

for loading and unloading air cargo features ease of operation, light weight and new "angle" on tubular construction

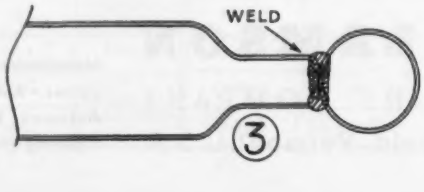

②

A LIGHTWEIGHT, sturdy, portable conveyor with unique features has been put to work loading and unloading air cargo. It has a high safety factor and is easy to operate because of its welded tubular construction. The "Air Cargoveyor," shown in Fig. 1, is built by Rapids-Standard Co., Grand Rapids, Mich., and eye-appeal in its design was achieved in co-operation with Pennsylvania Central Airlines engineers.

Arc welding was used for fabricating the tubing selected for frame members and support struts of the chassis, or base running gear, shown in Fig. 2. Conveyor bed elevating arm also is of tubular construction. Hydraulic ram upper pivot is strut-braced so that load is carried by both longitudinal members. These members, in turn, converge on a cross tube which houses the trolley shaft. This trolley shaft is threaded on both ends and becomes a tension member rigidly supporting the trolley that in turn elevates conveyor bed.

Conveyor bed is of formed 12-gage sheet steel. Construction lends itself readily to a roller bed, which combines ball bearing load carriers in addition to the advantages of a slider board type of conveyor. To avoid damage to airplane or luggage, bumpers are provided to prevent any metal-to-metal contact between conveyor and airplane.

Conveyor bed is elevated by means of a hydraulic pump and ram to an operating pitch of 25°. After tests were conducted with various belts and operating ranges, a pitch of 25° was found to be most economical when using a special rough belting which has a very high friction coefficient. This belt and operating angle has safely carried bags and packages weighing from a few ounces to several hundred pounds. Maximum carrying capacity is 750 lb distributed load. A deadweight load of 1350 lb has been supported by the machine at the end of the conveyor bed during tests.



③

Total weight is 1500 lb, giving a deadweight-to-lifting-capacity ratio of 2 to 1. Control of belt motion is possible from either the ground or inside the ship. Guard rails are provided for both safe handling of cargo and safety of the cargo handler getting in and out of the cargo bins, using the conveyor as a ramp. A retracting stabilizer of tubular construction keeps the machine steady during operation and also takes the place of wheel brakes. All electrical apparatus including night operating light, is weatherproofed. An explosion-proof pendant switch is carried into the cabin for safe operation of the conveyor from inside the ship. Electric cord for control is fastened to the conveyor by means of a water-proof plug and receptacle, allowing the machine to be used at various gate positions without dragging the cord.

Simplicity of design and ease of operation make this machine practical for either male or female ground operators. Only one handler is required to move conveyor on its large pneumatic tires and roller bearing wheels. A tubular handle that pivots to one side during operation is used for steering.

On bracing struts, tubing is flattened with miter sheared to the proper angle, as shown in Fig. 3. This allows ample weld length for strength and retains a neat appearance. Very simple jigs were used to hold various assemblies in position during welding. Electrodes of the shielded arc type (of 5/32 and 3/16-in. diameters) for mild steel (AWS E-6012) were used in single pass.

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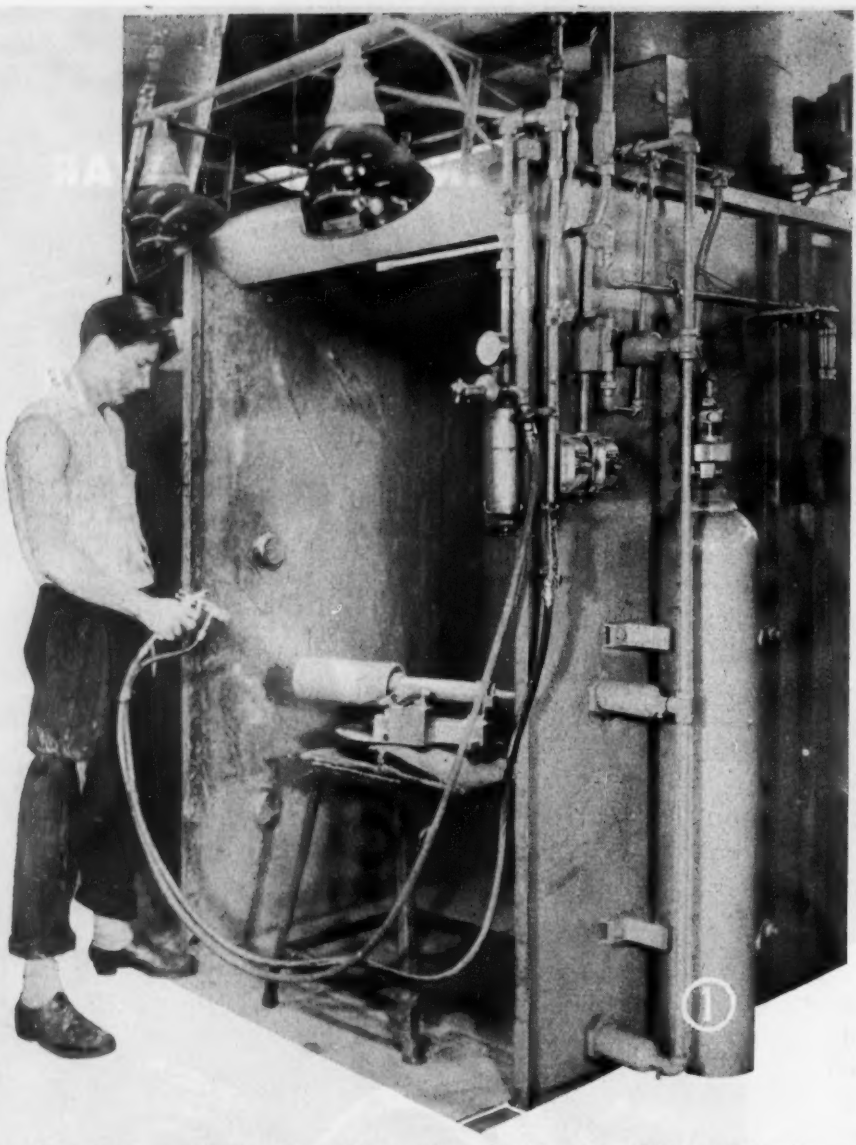

Fig. 1—Spray booth with built-in carbon dioxide extinguishing equipment

Safe Handling of

ORGANIC SOLVENTS

Thorough understanding of the character of organic solvents and approved methods of controlling hazards is necessary for safe operation of degreasers, spray booths, etc. Fire, skin irritation and toxic poisoning are principal dangers

By LILLIAN GORDON
Safety Research Institute
New York

ORGANIC solvents are important in the metal industry because they dissolve a wide variety of compounds, and because they are volatile. Their solvent character makes them useful as thinners and degreasers. Their volatility is important in allowing degreasing in the vapor phase and quick drying of the degreased or finished article. These same characteristics of solvency and volatility, however, present certain problems in the handling of organic solvents. Their volatility may be a fire or health hazard or both; their solvent character may result in skin difficulties.

The hazard presented by a solvent, in terms of flammability or effect on health, may be readily evaluated from information supplied by its manufacturers, or by federal and state health authorities, insurance companies and other agencies. Flammability of solvents, for instance, is rated by Underwriters' Laboratories on a scale ranging from zero (nonflammable) to 110. The ratings of solvents commonly used in the metal industry are listed in the accompanying table. Any solvent whose rating is above 40 is considered highly flammable, and the following safety precautions are recommended:

1. All flames, smoking, etc., must be eliminated and all sources of sparks removed. Rubber-soled shoes and tools of nonferrous materials should be used.
2. All equipment for handling flammable solvents, including funnels and portable containers when the latter are being filled or emptied, should be electrically grounded.
3. The solvent should be stored in safety tanks, preferably in a fireproof storage building.
4. Electrical equipment, including vapor-proof safety lamps, should be installed in accordance with the National Electrical Code for hazardous locations.
5. In spray booths, the booth, floor, baffles, and all other parts of the system should be constructed of fire-resistive material. Surfaces of all walls should be smooth to facilitate routine cleaning.
6. Fire extinguishers, of types approved for the class of hazard involved, should be provided as protection against incipient fires. Built-in fire extinguishing equipment may be needed to safeguard specific hazards, such as degreasing tanks, as well as to give general building protection. A finishing spray booth with special built-in carbon dioxide extinguishing equipment is shown in Fig. 1.
7. Ventilation must be provided for, to keep the concentration of flammable vapors below their explosive limits, with special care that heavy vapors do not accumulate in pits, cellars, etc.

The chief health hazard of organic solvents is associated with continuous inhalation of their vapors. Like all air contaminants, solvent vapors are dangerous when present in sufficient quantities. Therefore, the most pertinent information concerning the health hazard of any solvent is the concentration of its vapor which may be present in the workroom atmosphere without causing ill effects. The generally accepted limits are listed in accompanying table.

If this concentration is exceeded for any length of time, the individual concerned may develop the various symptoms (headache, nausea, dizziness, gastric disturbances, fatigue, mental disturbance) usually associated with chronic solvent poisoning. Fortunately, the body can throw off considerable quantities of toxic substances, so that removal from the contaminated atmosphere usually results in complete recovery. Continued exposure, however, may lead to permanent organic injury.

Unless the solvent-using process is very small and located in a large room isolated from other processes, it is likely that mechanical ventilation will be re-

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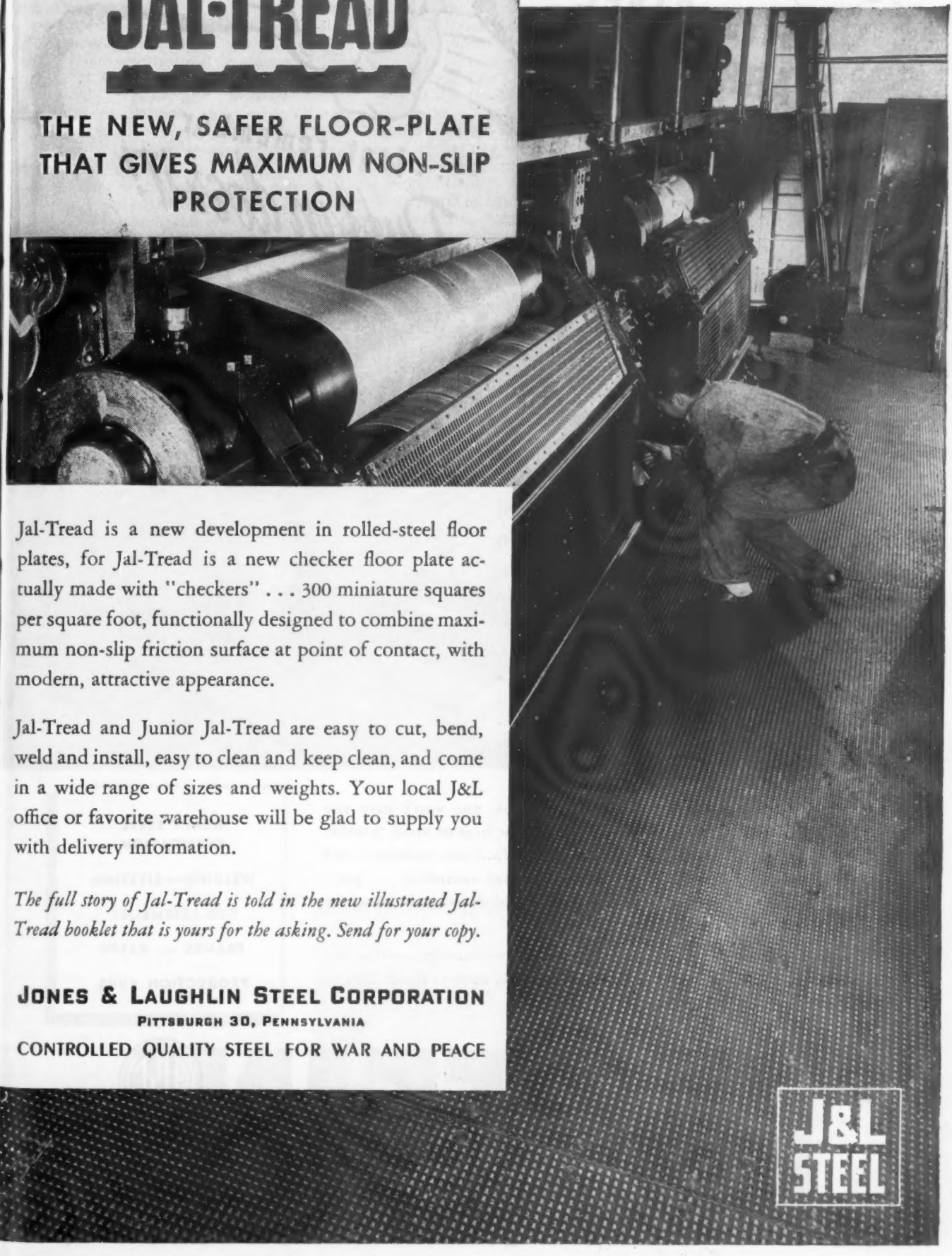

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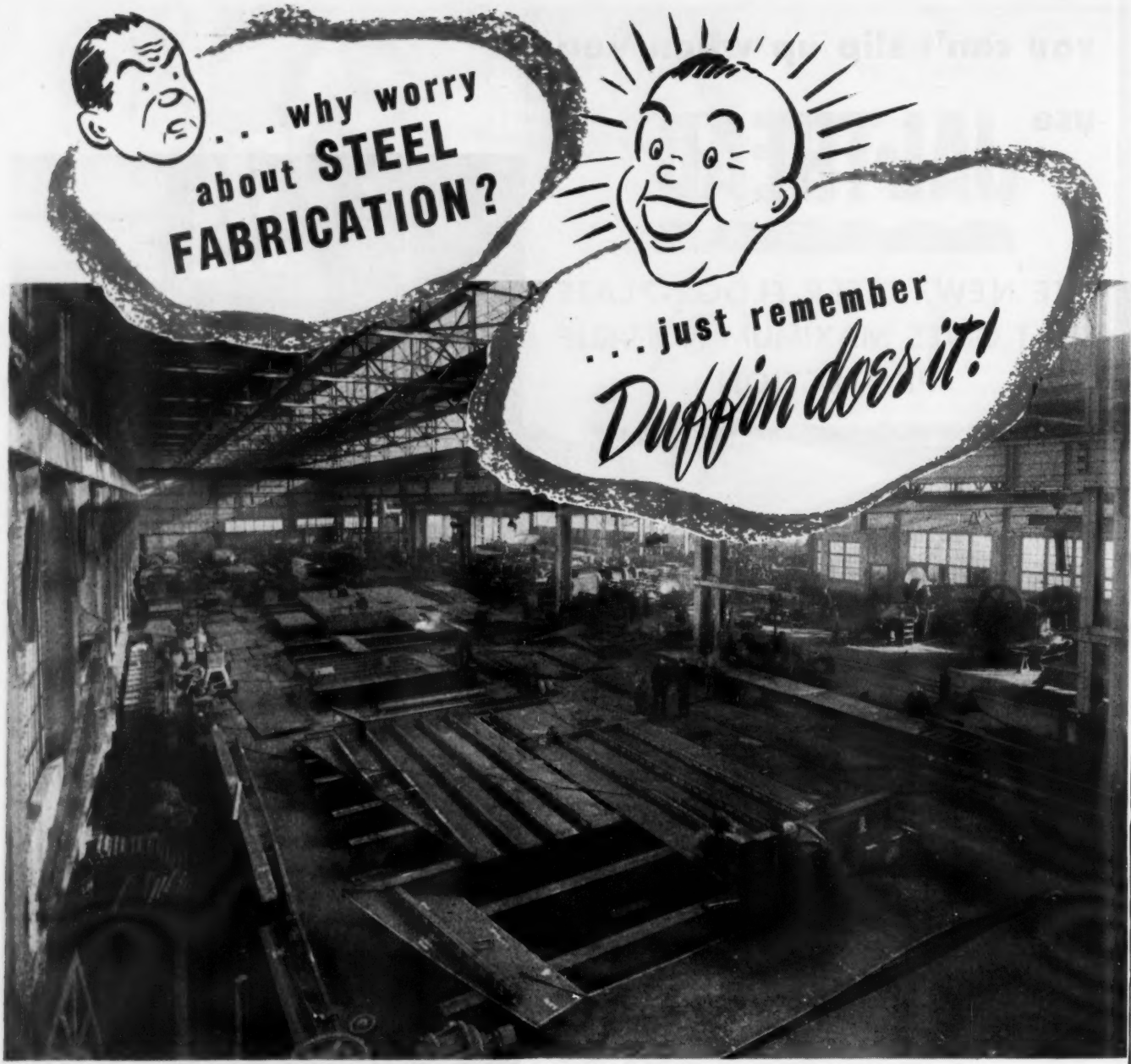

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quired to maintain vapor concentrations within safe limits. The Industrial Hygiene Code of the American Foundrymen's Association requires mechanical exhaust ventilation unless the degreasing machine or tank has a cross section of less than 5 sq ft and is located in a room of more than 4000 cu ft. A cartridge clip degreaser which will use chlorinated solvent is shown in Fig. 2. Exhaust system will be attached to collar at right side of slide. Fig. 3 shows 3-dip, basket-type degreaser. When installed, slot-type lateral exhaust is attached to venting system by collar at upper right-hand edge of machine. Velocity is 500 fpm.

In installing ventilating systems, it is desirable to obtain the expert advice of a ventilation engineer so that the equipment may be designed properly to suit both the process and the solvent in terms of size, flammability, etc.

Engineering controls are incomplete without some source of routine check-up. Solvents should be tested regularly, since a solvent mixture may have changed in composition, increasing its flammability, or a new supply of previously tested solvent may contain an impurity that has increased toxicity.

Regular analysis of the vapor content of the air at danger spots, such as cleaning tanks, as well as the general workroom atmosphere should be carried out. A change in the process—even a change in the weather—may sometimes make a previously satisfactory ventilating system inadequate. Such tests may be made by competent chemists, using reliable methods such as those listed in the bulletin, "Industrial Air Analysis," issued by the Division of Industrial Hygiene of the New York State Department of Labor.

Even where adequate ventilating systems are installed, special precautions must be observed to avoid acute solvent poisoning from the inhalation of large quantities of vapor as a result of accident or carelessness.

The cleaning of solvent tanks in particular is a hazardous operation requiring special procedures, such as those outlined in the American Foundryman's Code. Workers engaged in the operation should wear life lines and air-supplied respirators. Such respirators also may prove adequate in intermittent operations where general ventilation is not provided.

Organic solvents may cause skin troubles, either by their drying action on the skin or because they may give rise to allergic reactions. This may be avoided by protecting all parts of the body with clothing or protective creams. Hand creams are particularly important in hand dipping operations. Personal cleanliness reduces dermatitis, and may be encouraged by good washing conditions and cleansing agents which are effective but not harsh.

Medical control is important in minimizing health hazards connected with solvents. Pre-placement examinations may be used to determine the proper placement of employes with particular susceptibility to solvents in jobs where it is not necessary to contact appreciable amounts of these materials. Regular medical check-ups are recommended also.

To be really effective, engineering and medical control of solvent hazards must be implemented with an adequate education and safety program. It is generally agreed that such a program is most successful when it is formulated and enforced with the participation of the employes themselves. The worker should understand the hazards involved, and the controls instituted to protect him. He should be trained in the operation of these controls, particularly in the handling of fire protection equipment and in the recognition of ventilation breakdowns or leaks. Such education and training can do much to maintain a high safety record in the metal industries.

HAZARDS OF SOLVENTS

Solvent	MAC* (p.p.m.)	Underwriters' Laboratories Flammability Rating	Flash Pt. (°F)
Acetone	200 (Cal., Colo.)	90	0
Amyl acetate	400	55-60	77
Benzene (benzol)	100 (A.S.A.)	95-100	-4
Benzine and gasoline	1000	95-100	0
Butyl alcohol (secondary)	100 (Cal.)		82
Butyl acetate	400 (Cal., Mass.)	55-60	72
Carbon tetrachloride	100	0	None
Ethyl alcohol	250 (Cal., Colo.)	70	55
Ethylene dichloride	100		58
Isopropyl alcohol		55-60	59
Kerosene	**	40	100-165
Methyl alcohol	200	70	52
Stoddard's solvent	**	30-40	100-110
Tetrachlor-ethylene	200	0	-
Toluene	200 (A.S.A.)	75-80	40
Trichlor-ethylene	200	1-2	-
Turpentine	200	45-50	95

*The figures given are as recommended by the Division of Industrial Hygiene, U. S. Public Health Service, unless otherwise indicated, and represent maximum allowable concentrations (M.A.C.) in the atmosphere for continuous (8-hour daily) exposure, in terms of parts of vapor per million parts of air (p.p.m.). "ASA" following certain of the figures indicates the limit established by the American Standards Association. Some states have set their own limits which must, of course, be observed in those states.

**About the same as other petroleum solvents.

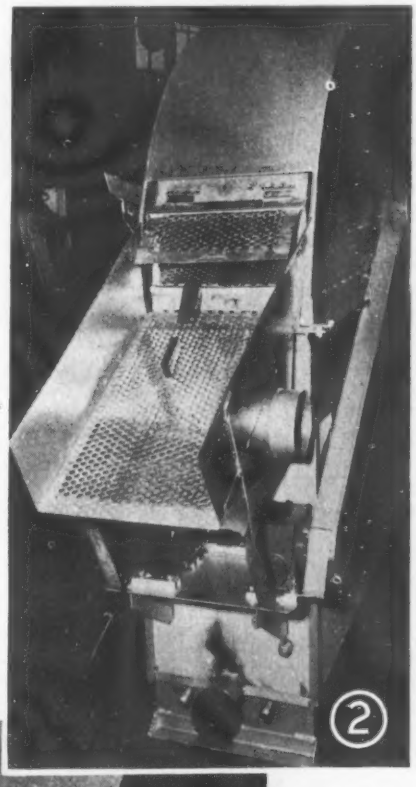

Fig. 2—Vapor from any solvent adhering to degreased cartridge clips will be drawn off by an exhaust system to be attached at right of this unit

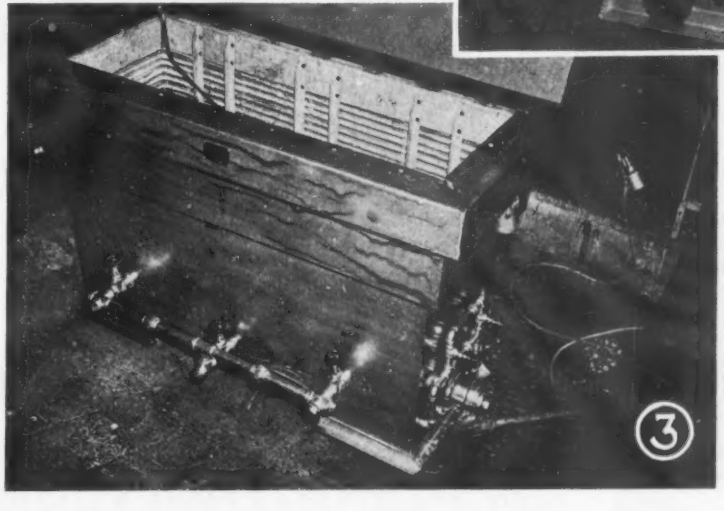

Fig. 3—Built for use with a crane hoist, this three-dip, basket-type degreaser also employs chlorinated solvent for degreasing

West Coast Steel Mill

. . . . features modern rod mill layout, described here in third of a series of four articles detailing facilities and practice at Columbia Steel Co.

By G. ELDRIDGE STEDMAN

LATEST equipment and controls feature the rod mill of the Columbia Steel Co., Pittsburg, Calif. The 100 x 280 ft billet storage yard at the rod mill's west end has seven 40-ft bays and a total of 63 bins. Billets are racked a single heat to a bin, there being about 250 billets to a bin. This storage yard is serviced by a 15-ton overhead crane with a 100 ft span.

Billets come first to the rod mill's charging platform, accommodating 150 billets, and are moved on to the furnace conveyor by an electrically-driven walking beam conveyor.

The furnace is of the continuous pusher type. It has eight pusher arms, a 50-ton per hour capacity and inside walls 33 ft wide and 40 ft long to the middle push-out. It is gas fired by 27 burners, the heating zone being fired by 12 top burners, the soaking zone having 15 bottom burners. The furnace is automatically controlled by recording pyrometers for 3-position reading, and fully equipped with gas flow meter control, instrumentation being mounted on a big control panel near the furnace end. The billets soak after preheat at 2250 to 2350° F, the two zones being separated by low arch. The furnace takes a 172-billet load, the subsequent hot rolling being from 5-gage to 1 in. rod. Billets are in the furnace from 75 to 90 min, production of the furnace being about 135 to 190 per hour. The last 15 ft of furnace has a plastic chrome hearth with some magnesia. Billets are removed from the furnace by a pusher into No. 0 stand.

The 21 stands in line back of the furnace are numbered from 0 to 20 inclusive. Starting with a zero is done to permit the even numbered passes to be square or round and the odds to be oval in designating the shape of the passes in each stand. The first two stands are oval and very shallow. The sequence is:

Stand Nos.	Type Stands
0 to 3,	16-inch roughing
4 to 8,	14-inch roughing
9 to 14,	12-inch intermediate
15 to 20,	10-inch finishing

The rod mill is powered by nine main mill motors totaling 7650 hp, the power plant being housed in a separately enclosed annex that is a model of efficient layout, spaciousness and good housekeeping.

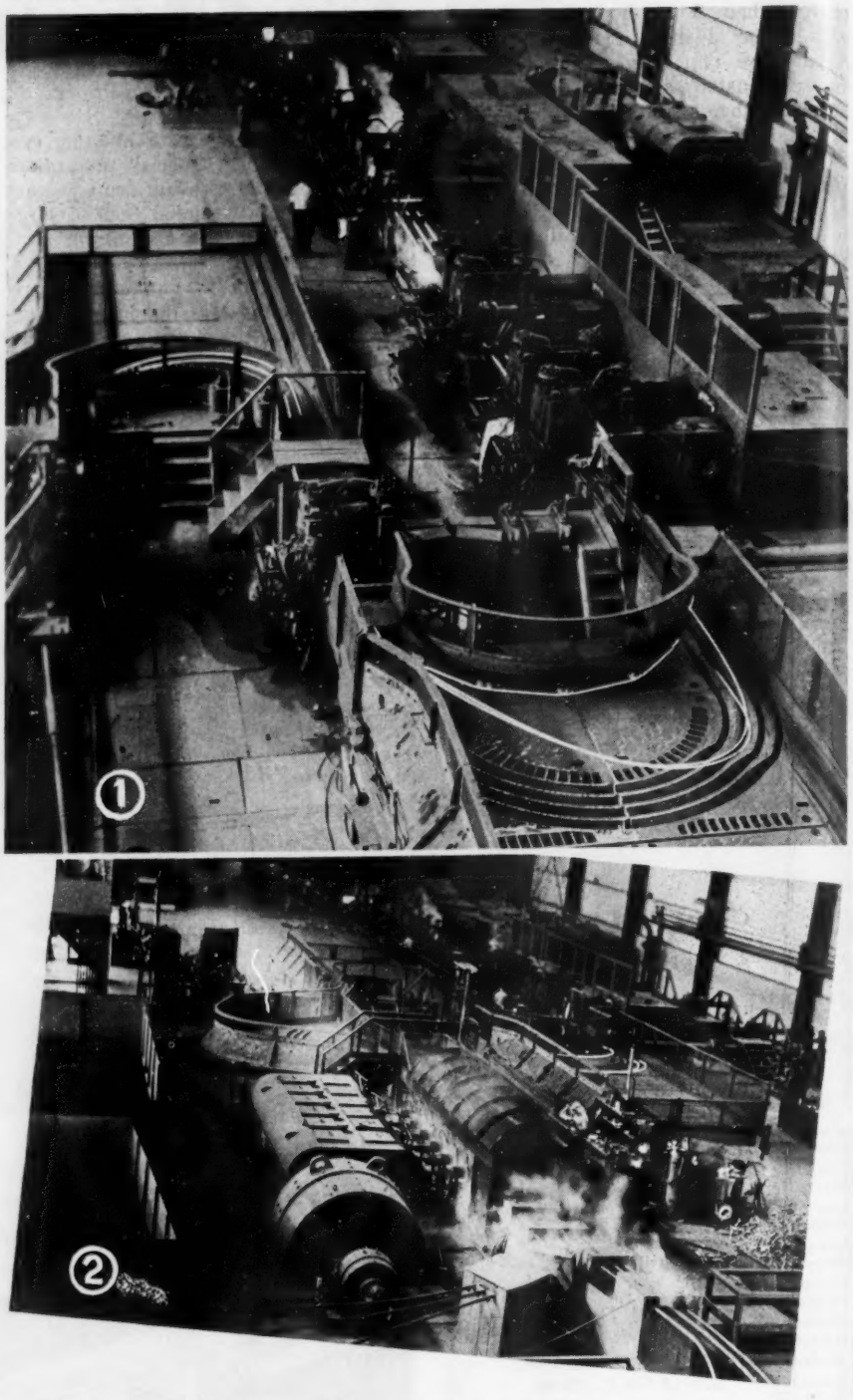

Fig. 1—Overall view of roughing train and two repeaters

Fig. 2—Finishing end of mill. Scalebreaker with high pressure water jets and 6-stands of offset rolls shown in foreground

No. 0 and No. 1 stands are driven by a 500 hp variable-speed motor with a roll speed from 7.7 to 23.3 rpm. No. 2 stand is driven by a 400 hp, variable-speed motor. Carrier top and bottom bearings are fabric and require no grease lubrication—only water, their wear being slight. Old type bronze bearings wore excessively, and it was difficult to keep the rolls lined up properly and to maintain rolling positions. This is obviated in the setup, only slight adjustments being required. Universal couplings are employed throughout.

Three stands are run, finishing from No. 5 to 3/8-in. rod inclusively, the work

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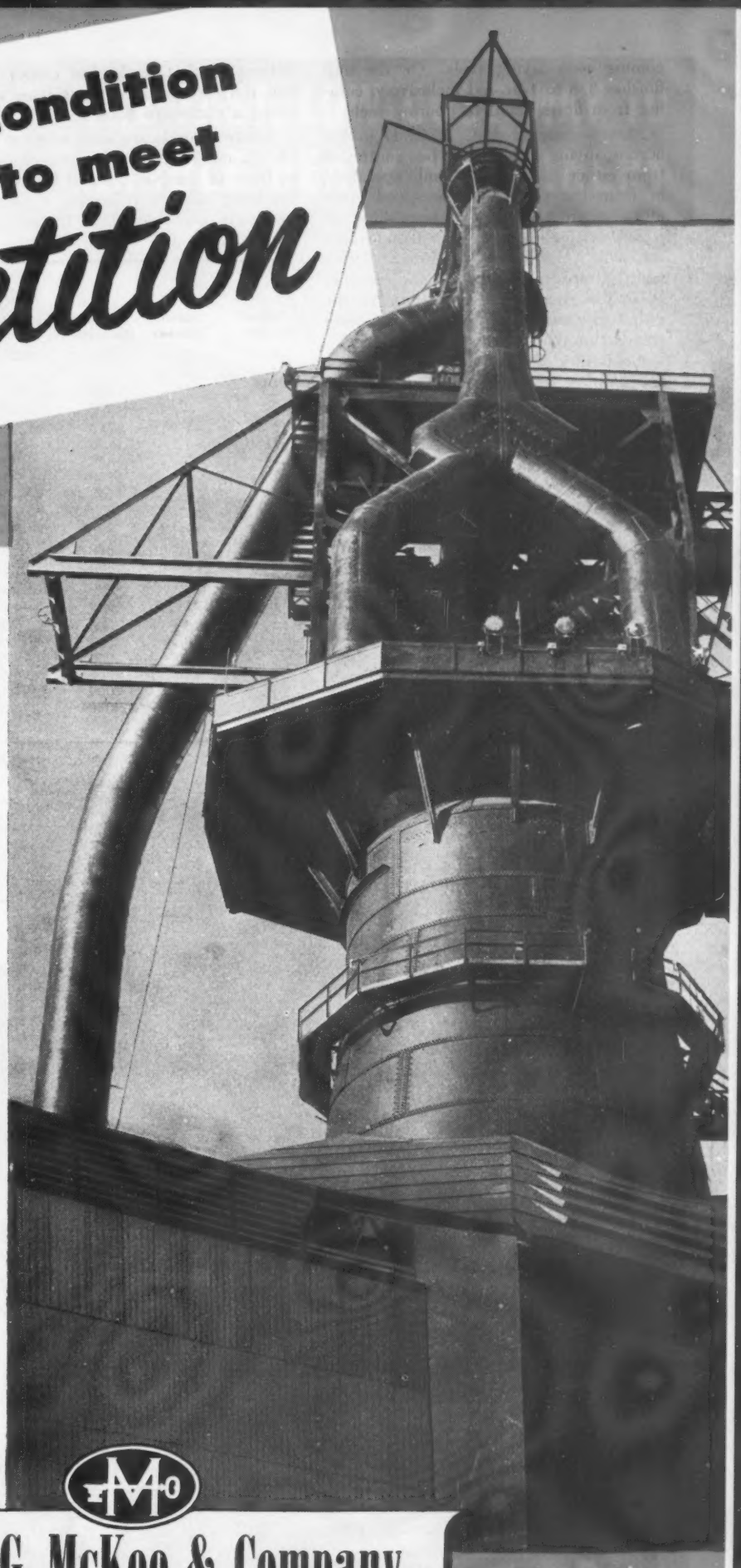

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coming onto laying reels. Or the mill finishes 3/8 to 1-in. rod inclusively, coming from finish stand to pouring reels.

Motors designated A, B, C, D in the accompanying table can be controlled from either the floor by mill operators, or from the pulpit by the speed operators, there being the possibility of hazardous buckle or pull that one might see which the other would not. Safety controls are instantaneous and precise. It is the speed operator's duty in the pulpit to watch three repeaters and other stands throughout the mill.

Continuity of stands creates pull which the looping setup relieves by rod play on the repeater floors. Repeating is all automatic. The bar is repeated out of No. 12 stand as a square, into No. 13 out of No. 13 as an oval, and then repeated into No 14 stand. It goes through a forward-running "S" repeater as a square, from No. 14 stand into No. 15 finishing mill which is an oval, the latter being the first stand of the finishing mill sequence.

Size 4 or 5-gage rod is finished from No. 20 stand, ¼-in. from No. 18, 5/16 or 3/8-in. from No. 16 stand.

A looping stand is located in front of the pulpit. The 180° repeaters between Nos. 12 and 13 and Nos. 13 and 14 stands are equipped with rollers set in buttons so that if the bar comes up it will roll on bearings rather than scrape along a stationary floor.

Safety controls are used when a "cobble" is made. A toggle shear is located in front of the No. 0 stand that can cut the billet off as it is leaving the furnace in case of a cobble. After the ninth pass (the work leaving the No. 8 stand), a flying shear is installed. This provides a front end cut-off to furnish a good end to go through the mill after roughing, and also to cut off any cobble that may develop after that point.

If a cobble should occur in the finish-

(*Please turn to Page* 174)

ROD MILL (21 STANDS)

Motor Number	Stand Number	Motor Horsepower	Motor Variable R.P.M.	Roll Speed R.P.M.	
A	0	500	250 to 750	7.77 to 23.31	Driven from one motor
A	1	....	.....	10.90 to 32.70	
B	2	400	250 to 750	13.83 to 41.49	
C	3	400	250 to 750	17.33 to 51.99	
D	4	1750	150 to 450	32.25 to 96.75	
D	5	1750	150 to 450	47.77 to 143.31	
D	6	1750	150 to 450	68.50 to 205.50	Driven from one motor
D	7	1750	150 to 450	91.75 to 275 25	
D	8	1750	150 to 450	119.27 to 357.81	
E	9	800	300 to 900	126.09 to 378.27	Driven from one motor
E	10	800	300 to 900	158.19 to 474.57	
F	11	800	300 to 900	173.33 to 519.99	Driven from one motor
F	12	800	300 to 900	210.81 to 632.43	
G	13	500	225 to 625	225.00 to 625.00	
H	14	500	225 to 625	225.00 to 625.00	
J	15	2000	450 to 690	497.07 to 762.17	
J	16	2000	450 to 690	574.65 to 881.13	
J	17	2000	450 to 690	650.79 to 997.88	Driven from one motor
J	18	2000	450 to 690	747.58 to 1146.30	
J	19	2000	450 to 690	851.80 to 1306.10	
J	20	2000	450 to 690	982.66 to 1506.75	

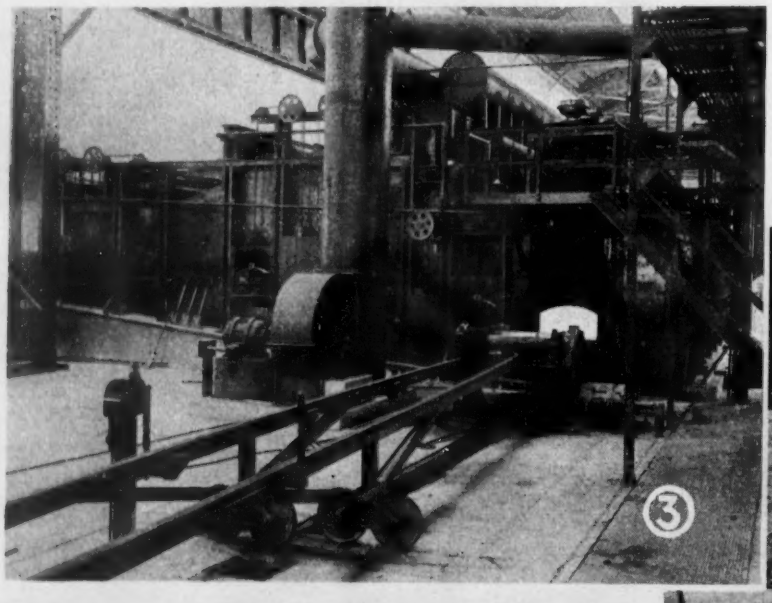


Fig. 3—Side view of 33 x 50-ft heating furnace. Billet pusher shown in foreground

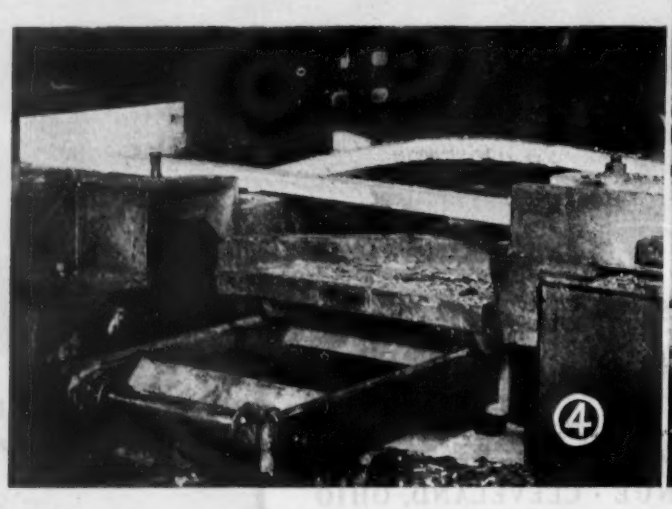
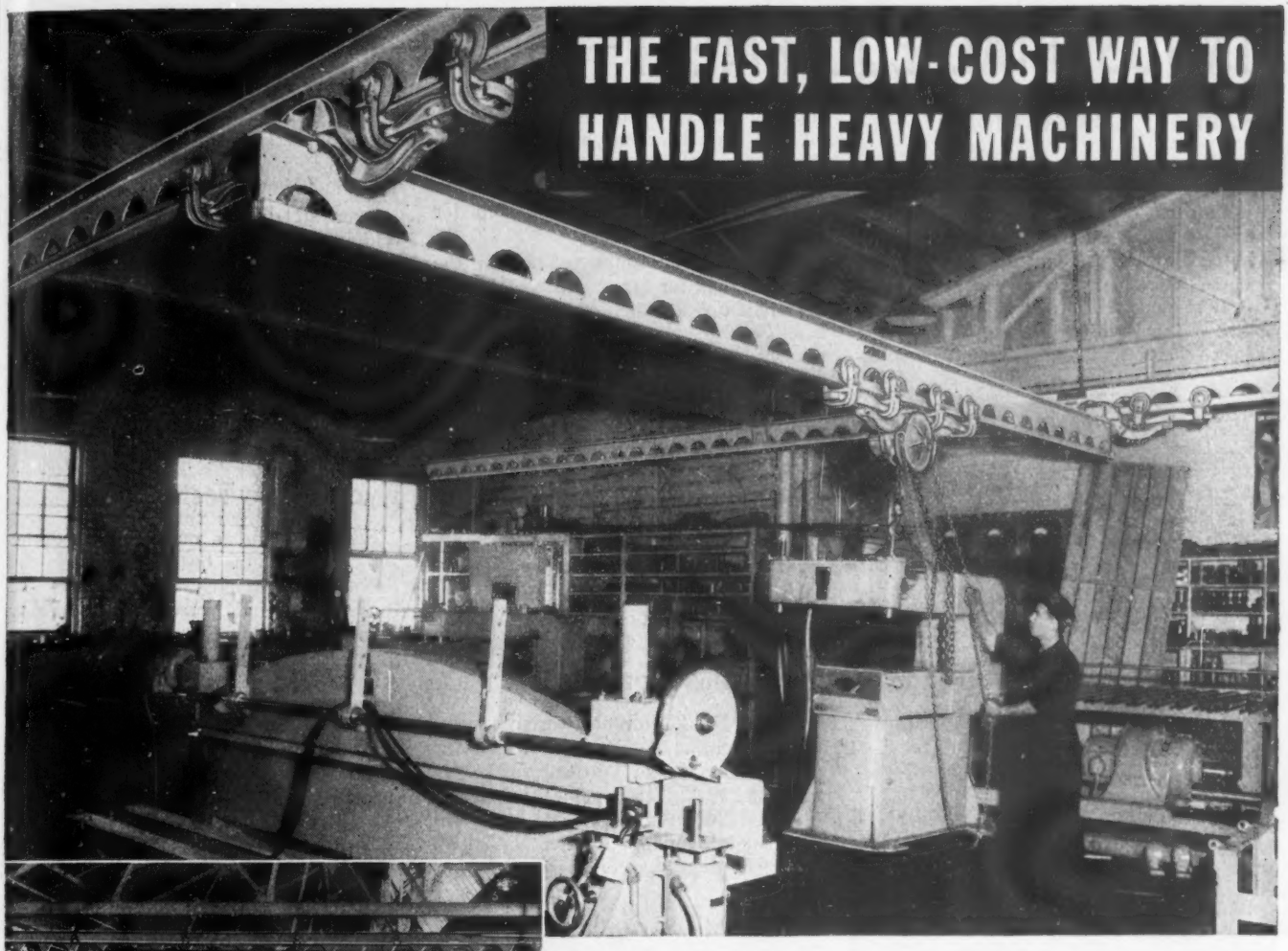


Fig. 4—Standard 30-ft billet being pushed from hearth of heating furnace

Fig. 5—Finished rod coils traveling on cooling conveyor

THE FAST, LOW-COST WAY TO HANDLE HEAVY MACHINERY



Hand-propelled crane with chain hoist handling heavy steel frame for veneer machine.

Hand-propelled crane with electric push-button operated hoist moving a diesel engine.

IF HARD back-breaking work is required on the part of several men to move a machine in your plant, you should seriously consider Cleveland Tramrail cranes.

A heavy engine or machine-tool can be quickly and safely moved by one or two men with a smooth running Cleveland Tramrail crane. Shipping boxes or crates are easily packed. Work that requires *hours* can often be done in *minutes* with an overhead crane.

Despite the great advantages Cranes provide, they are low in price. In fact, many completely pay for themselves in only a few months time. Cleveland Tramrail cranes are built in various types for manual and electric operation.

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CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1125 EAST 283RD ST. WICKLIFFE, OHIO.

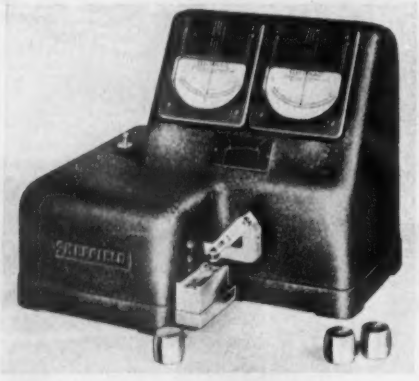
CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

INDUSTRIAL EQUIPMENT

Contour Comparator

A bearing contour comparator with Electrigage heads has been developed by Sheffield Corp., Dayton, O. The gage checks barrel shaped bearing rollers for correctness of contour only. No direct check is made on any diameter.

Bearing slides into gaging position on two rails, coming to rest against the fixed center arm and lower roller back-



stop. Upper roller is spring loaded to exert enough pressure on bearing to keep it in gaging position while being rotated for complete contour check.

Upper and lower arms at left do gaging while middle arm is fixed for positioning the bearing roller. The gaging fingers move reed mechanisms which in turn actuate the Electrigage heads. Middle arm is adjustable for various contours.

Regrinding Machine

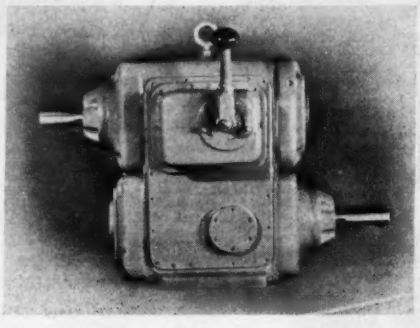
A new autopart and crankshaft regrinding machine in sizes 22 x 72 in. and 24 x 84 in. is announced by Norton Co., Worcester, Mass. It has been designed for regrinding of crankshaft pins and bearings on automotive, tractor, diesel and truck shafts and is adaptable for use in any machine or jobbing shop.

Features of the machine include headstock and footstock with antifriction spindle with adjustable work holder mounted on each of these spindles. When grinding crankpins the shaft is held on the end main bearings. Any wear occurring in the work holders over a period of years can be compensated by an adjustment which has been provided for in its construction.

The locator indicates position of the crankpin both for throw and plane showing amount of adjustment necessary. Hand wheel on steadyrest graduated in thousandths, is used to make necessary corrections for out-of-plane conditions. Adjustments for throw are similarly made with graduated screws in work holders. This indicator can also be used for a grinding gage to indicate size as compared to a pre-established standard or to show amount of stock being removed. Machine is designed so that both crankpins and bearings can be ground with a minimum expenditure of time for setup between operations.

Hydraulic Transmission

Model HT-1 hydraulic variable speed transmission, announced by Portman Machine Tool Co., 70 Portman road, New Rochelle, N. Y., is a heavy duty type and intended for use as a variable speed drive unit for all kinds of industrial applications requiring continuous duty per-



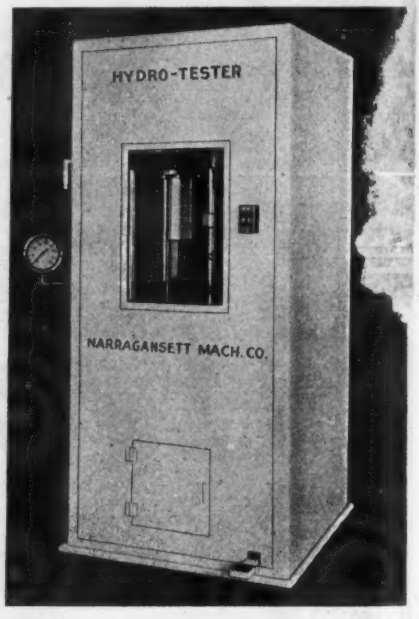
formance under varying conditions of load and speed.

Infinitely variable speeds are instantly available from zero or full neutral position to maximum motor speeds both forward and reverse. In this drive unit torque output remains constant at all speeds. Various types of control mechanisms in addition to the hand shown are available to suit all applications, including remote control station

Over all dimensions are as follows Width, 8½ in.; height, 16¾ in.; overhousing length, 18½ in.; diameter shaft, 1⅜ in.; shaft extension length 3½ in. and 4½ in. Capacities available are 5, 7½, 10, 15 and 20 hp. Maximum speed depends upon speed of electric drive motors or other prime movers and such speeds are rated at from 900 to 1700 rpm with this type unit.

Hydrostatic Tester

For testing tubes and cylinders, Series 100-5 hydrostatic tester is offered by Narragansett Machine Co., Providence R. I. Intended primarily for testing 5 in. rocket tubes, it can be provided to test tubes and cylinders of almost

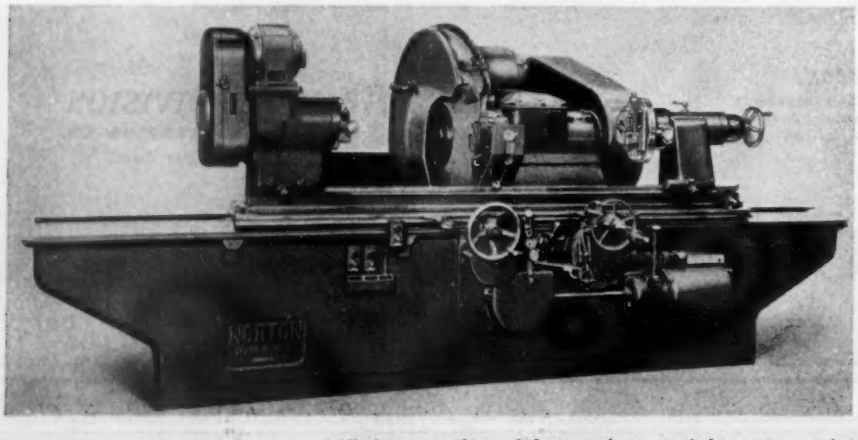


any size and shape. It is of ram type, adjustable to tubes of varying diameters and lengths and is motor operated through reduction gears with enclosed automatic switches.

Testing is accomplished by introducing water at city pressure (normally 80 psi) into the cylinder under test while cylinder is held between two fabricated, specially designed steel adapter plates which seal both ends of cylinder being tested.

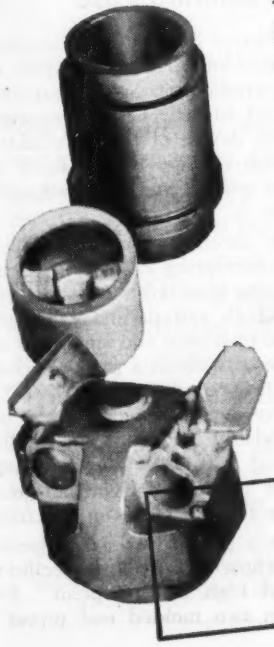
Hydrostatic pressures up to 6000 psi are produced by an air cylinder under testing cylinder. Air cylinder piston extends up and through bottom of machine into the water filled cylinder or tube to be tested, causing controlled, measured displacement up to the hydrostatic pressure desired.

Hydrostatic pressure range may be extended through use of hydrostatic boos-



(All claims are those of the manufacturer of the equipment being described)

Birthplace of many "firsts" in forgings



FORGING efficiency is born when the die for that forging is shaped. This great Tube Turns tool and die shop, largest in the South, has been the "delivery room" for many forgings ideas which have helped speed victory. Out of this shop have come techniques and abilities with steel and light metals, available now to improve industry's peacetime products.

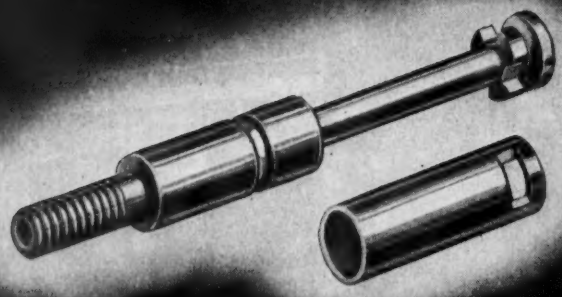
Tube Turns has complete chemical, physical, and electrical laboratory facilities, upset and mechanical press equipment, and modern automatic precision heat treating furnaces . . . all manned by experienced, carefully trained personnel.

Whether your own task of the moment deals with the design of new machines or the improvement of present products, you are invited to submit your problem to Tube Turns. Our engineers will consider your questions promptly, comprehensively, and without obligation. Write to Tube Turns (Inc.), Louisville 1, Kentucky.

TUBE TURNS *Forgings for Industry*

SPEED CASE STEEL

A LOW CARBON OPEN HEARTH PRODUCT



will replace -

C 1117	B 1113
C 1118	C 1019
B 1112	C 1115

and it will **machine at 230 to 250 SFPM while increasing tool life 2 to 5 times. It will give you ductility equal to C1019 with tensile strength greater than C1117. When carburized, warpage is minimum and it machines with better finish than comparable steels.**

SPEED CASE STEEL will increase your production from 40% to 80% and it is saving users up to $70 per ton used.

REDUCE YOUR INVENTORY AND INCREASE PRODUCTION WITH SPEED CASE...

ACTUAL PHOTOGRAPH
Speed Case Steel (.20 carbon) 1-inch cold drawn bar tied in a knot, cold, without fracture.

Write for Speed Case Catalog. For special jobs our metallurgists are at your service. Find out about Speed Case Steel.

Licensor

MONARCH STEEL COMPANY

HAMMOND · INDIANAPOLIS · CHICAGO

PECKOVER'S LTD., Toronto, Canadian Distributor.

Licensee for Eastern States

THE FITZSIMONS COMPANY

YOUNGSTOWN, OHIO

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

ter and coolant equipment which can be provided as additional equipment.

All working parts are enclosed in a metal cabinet. All operations, including that of the ram, introduction of water, movement of piston and release of water are under pushbutton control.

Centrifugal Pumps

A new line of Superflo centrifugal pumps is announced by Gray-Mills Co., 1948 Ridge avenue, Evanston, Ill. Higher volume delivery per horsepower and ease of maintenance are features of these pumps. Heavy duty motors are mounted integrally to pumps. Pump motors range in various sizes—1/25, ⅛, ¼ and ½ hp, with volumes of 9 to 75 gph. There are

13 basic models available with various voltage characteristics.

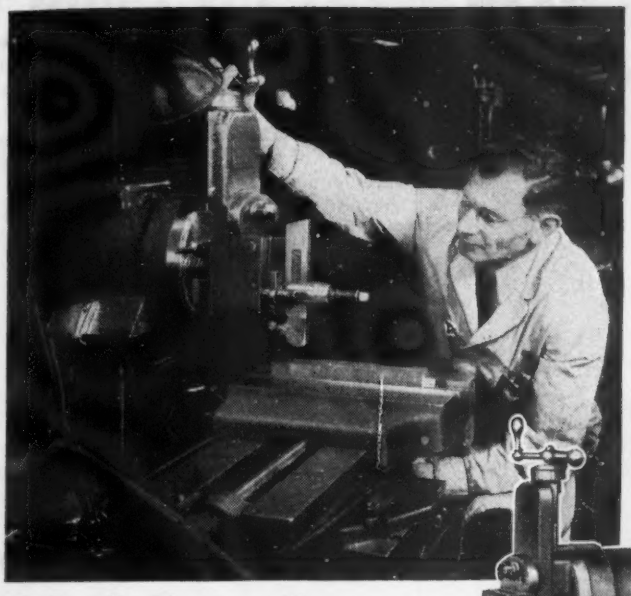
There are types for horizontal external mounting; for vertical external mounting and other pumps with floating impellers are made for submerging in coolant system reservoir. The latter may be used for fluids having abrasive content. Grease sealed motor bearings and mechanical seal of pumps require no lubrication.

Current Limiting Fuse

A new current limiting fuse developed for protection of aircraft electrical systems is a product of Switchgear Division, General Electric Co., Schenectady, N. Y. Basic design of fuse is similar to that of high-voltage power fuses developed for utility company and industrial service.

The fuse meets the requirements of adequate interrupting capacity, extremely short arcing time, vibration and shock resistances, high altitude and wide range temperature operation and small size and weight. Tests made in a pressure chamber simulating conditions at 40,000 ft altitude have demonstrated that the fuse will dependably interrupt more than 4000 amp at 120 v, 400 cycles, single phase ac, or at 120 v dc, with an arcing time of less than ¼ cycle on ac circuit.

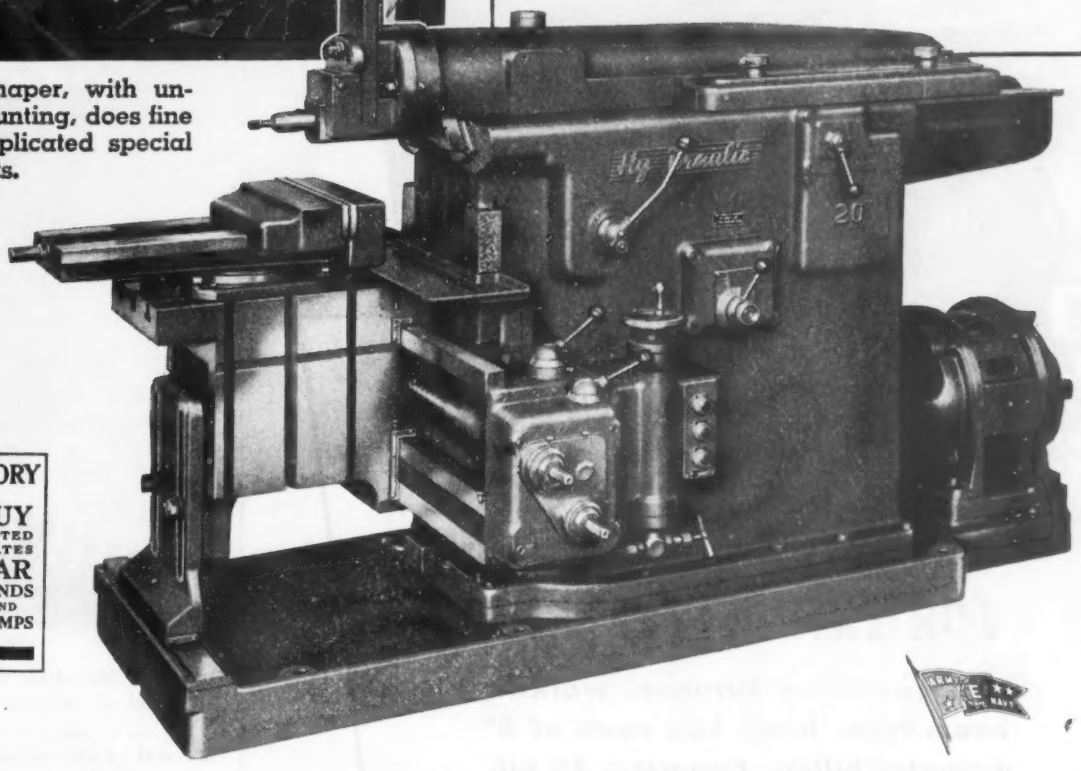
Fuse has a pure silver wire element. Silver was chosen for its low specific resistance and high melting point. Supported from two molded end pieces in



Hy-Draulic Shaper, with unusual tool mounting, does fine work on complicated special ordnance parts.

Hy-Draulic SHAPERS

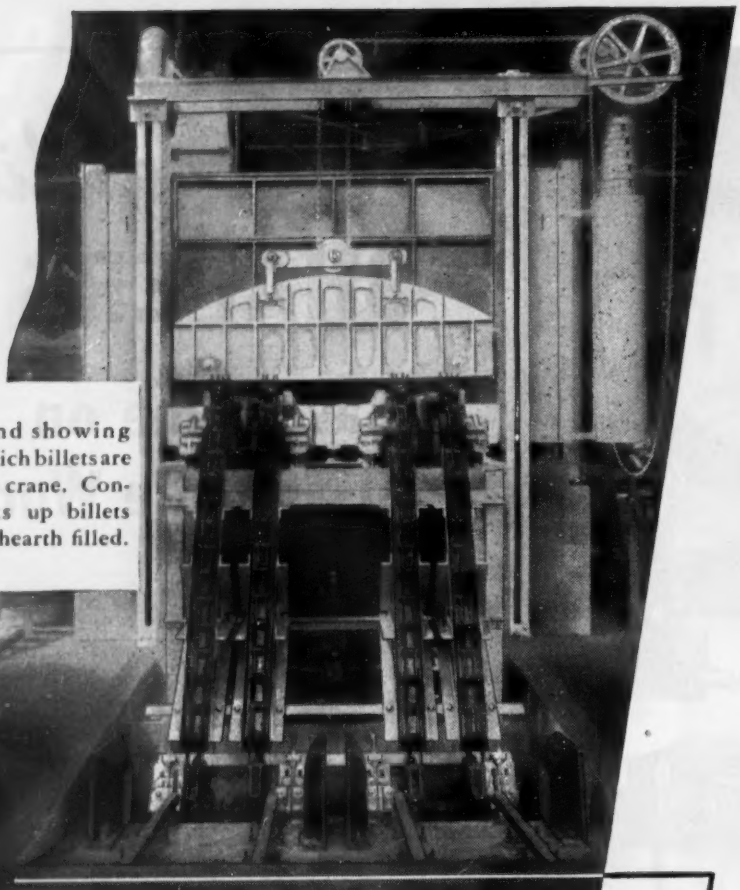
Save Time on Tool and Die Work



4413

Illustrated is a Hy-Draulic Shaper working on special ordnance parts machined from the solid out of very tough steel. The toolmaker running this shaper can concentrate completely on the work in process. Right under his hand are controls for rapid traverses in four directions and for hydraulic cutting speeds and feeds. He can get any cutting speed or feed whatever, in specified ranges, without gaps between, without gear-shifting, without stopping the machine. He can get ram-stroke length, and its position relative to the work, in one easy operation without cranking or using tools. These, and other Hy-Draulic advantages, save operator's time, speed production and promote economy on fine tool and die work . . . on run-of-mill shaper operations also. Investigate. See what Hy-Draulic Shapers can do on your work. Write us for name of nearest dealer, and ask for Bulletin 2904.

ROCKFORD MACHINE TOOL CO., ROCKFORD, ILLINOIS



Charge end showing pit into which billets are placed by crane. Conveyor picks up billets and keeps hearth filled.

CONTINUOUS

BRASS BILLET HEATING FOR EXTRUSION PRESS

R-S gas-fired Furnace, walking beam type, heats two rows of 8" diameter billets. Capacity: 70 billets or 28,000 pounds per hour. Temperature: 1500 degrees F. Billets delivered by roller conveyor to extrusion press.

R-S
QUALITY PRODUCTS SINCE 1903

R-S Furnaces of Distinction

FURNACE DIVISION
R-S PRODUCTS CORPORATION

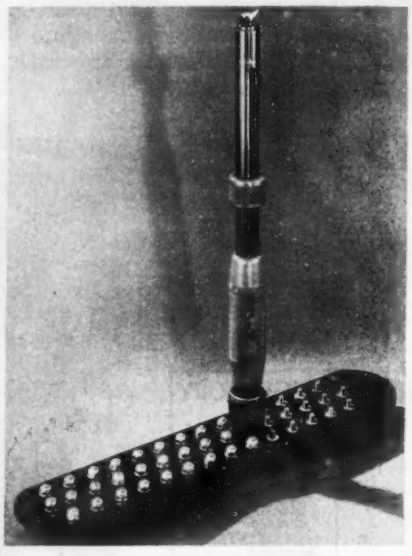
122 Berkley Street • Philadelphia 44, Penna.

BUY WAR BONDS

the center of a Pyrex glass tube, the silver wire element is surrounded by a special filler of granular quartz. Three such units comprise the fuse, providing a three-pole assembly with several advantages—fuse units in all phases must be replaced simultaneously; there is no chance of one phase being left open accidentally; and because phases are in separate isolated compartments phase-to-phase short circuits within device are prevented during interruption.

Magazine Feed Tool

Known as E-Z ON nut gun, a new magazine-feed tool for driving nuts on studs is announced by E-Z On Co., 9551 Grand River avenue, Detroit 4. The tool can be made for any size nut and any particular style: Castle, elastic stop, hexagon, square, slotted acorn or cap nut. A magazine inserted in the handle holds the nuts and delivers one at a time di-



rectly to the stud, and remaining nuts are held in position.

An air or electric nut driving unit can be used as the driving medium and the torque can be set on the driver at any required weight.

Work Table

Induction Heating Corp., 389 Lafayette street, New York 3, announces a new single position general purpose work table with optimum flexibility of range of applications when used with standard Thermonic induction generators. Equipped with a standard Thermonic output transformer, mounted so as to effect interchangeability from one type transformer to another, this table can be used for any application of induction heating. The table bench includes a sink for use in spray quenching operations. This sink is provided with a removable transite cover which can be used when a flat working surface is desired. Water piping provisions for spray quenching are incorporated in the table together with a solenoid-operated valve and a quench

Don't let reconversion catch you with your plants down

Your reconversion problems can be minimized with proper planning. Like other manufacturers whose plants have been devoted to war production, your primary postwar objective is to get your peacetime products to market with as little delay as possible. How long the public will wait for old pre-war favorites is problematical—with competitive products making an aggressive bid for pent-up buying power.

Many manufacturers recognize the importance of a flying start in their bid for postwar markets, and are following their wartime procedure for speeded-up production by arranging for the production of product parts by outside sources. Additional advantages of this course are lower capital investment and fewer labor problems—as well as superior workmanship and lower costs.

Joyce specializes in the quantity production of machined metal parts and machined assemblies . . . has the facilities, equipment and specialized experience to assume the production of product parts of any type—any quantity. Joyce is known from coast to coast for precision workmanship.

Why not sit down with us and discuss your postwar products—now? Let us show you how we can save you time in getting your peacetime products to market—and how we can step up quality while cutting down costs.

A telephone call, wire or letter will get you quick action—with no obligation.

JOYCE
Machine Company
FRANKFORD • PHILADELPHIA

MANUFACTURERS OF PRECISION PARTS AND SPECIAL MACHINES FOR ALL KEY INDUSTRIES

Help Eclipse the Rising Sun—Buy Bonds

Now is the time to Plan Parts-Production for Postwar Products

If you're dealing in tenths of a thousandth

PROTECT IT WITH MPM* FILTRATION

Take this Diesel injector nozzle as an example. The fine orifices in the spray tip are precision-drilled to exact tolerances to insure proper fuel injection. Yet unless these orifices are safeguarded against clogging or enlargement by harmful particles in the fuel, the benefits of precision manufacturing are lost.

To filter out these harmful particles, a Moraine Porous Metal filter element—bonded to a metal washer—is designed into the injector. It removes particles whose *largest dimension* is .001" to .002" . . . traps in its tortuous flow passages particles which would pass through the finest commercial screen.

Other types of applications for MPM filter elements include protection of *precision moving parts* against dirt in the lubricating or actuating fluid—*precision mechanisms* that are susceptible to dirt in the air—*any product* involving the flow of liquids, gases or air in which fine filtration or separation is required.

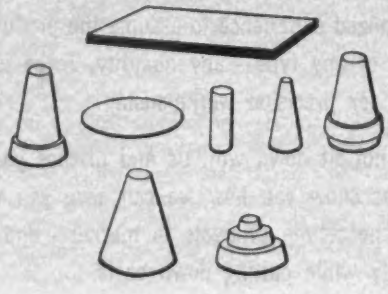
Where product performance depends on maintaining the accuracy of machined parts, Moraine Porous Metal has a lot to offer American industry.

KEEP YOUR BONDS—AND KEEP BUYING

*MORAINE POROUS METAL

A unique material of powder metallurgy, fabricated into efficient shapes and providing controlled porosity for these functions:

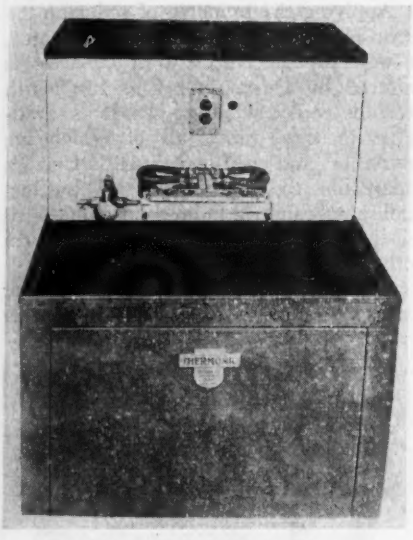
Filtration • Separation • Diffusion
Flow Control • Flame Arresters
Vents or Breathers



MORAINE PRODUCTS DIVISION OF GENERAL MOTORS

DAYTON, OHIO

flow regulator for controlling timing and volume of quench. Control circuit contains two timers; one for controlling quenching period and the other for controlling delay period from one end of heating cycle to the start of the quench cycle. Start and stop control buttons to energize the Thermonic generator are

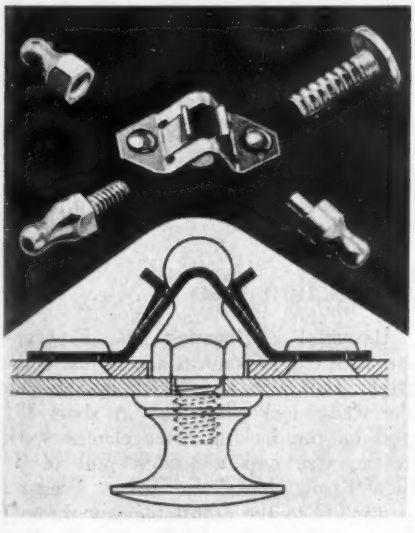


mounted on front of table together with pilot light indicators.

Output leads from transformer are supported by mounting brackets on front panel of table. These leads are equipped with interchangeable pressure type fittings for facilitating work-coil connections.

Speed Nut Latch

A new spring steel speed nut latch, No. 1663, has been developed by Tinnerman Products Inc., 2039 Fulton road, Cleveland 13, for attachment and removal of box covers, access doors,



panels and inspection p'ates. Spring arms of the nut snap over ball or grooved studs to provide firm attachment. Studs may be quickly withdrawn. It is available in five degrees of pull out tension. Three styles of ball studs are

MANEUVERABILITY · ADVANCED DESIGN *and* RUGGED CONSTRUCTION *are embodied in*

EUCLID HOISTS

Expert Euclid hoist design, plus an efficient clam shell bucket, make this a very compact and useful unit for loading, unloading and conveying coal, ashes and other materials.

This trolley is built to handle a single line bucket and travels along the overhead beam during each cycle of operations. The photo shows the trip line in front of operator. A pull on this line opens the bucket.

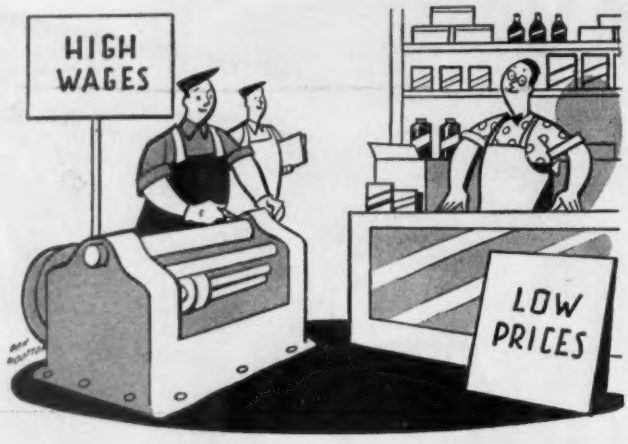
Euclid convenience of control and facility of operation contribute greatly to its high efficiency and comparatively low cost of operation.

In addition to the building of cranes and hoists Euclid experience embraces the designing of equipment to handle various types of related equipment, grabs, slings, etc., for handling unusual kinds and shapes of material

THE EUCLID CRANE & HOIST CO.

1355 CHARDON RD. EUCLID, OHIO

WE CAN DELIVER a limited number of 5 to 10 ton cranes in 60 to 90 days



WE CAN HAVE BOTH

One of the most vital questions we must answer today is—"How can we keep wage levels high and at the same time keep prices down within the reach of everybody's pocketbook?"

We can do it if we can keep costs down—for prices are geared to costs. Low costs require—

(1) —that products be designed to permit the lowest possible production costs.

(2) —that management skillfully plan production and establish and carry through cost controls.

(3) —that all production facilities be *right* for the purpose.

(4) —that labor produces a full day's work for a full day's pay.

(5) —that Government encourage, rather than hamper business and industry, including new ventures.

Volume alone will not cut costs. It will help, but to provide enough margin to maintain high industrial wages and low prices at the same time it will be necessary for us to use our Yankee ingenuity in better design, better planning, better tooling and better productivity.

We can't afford to produce a product unless we can sell it. We can't sell it unless we get the price down where people will buy it. We can't get the price down unless we get the cost down. And we can't get costs down unless we get efficient management and full productivity from labor.

Geo. D. Trundle Jr.
President

THE TRUNDLE ENGINEERING COMPANY

Brings to Industry and Business

26 Years **OF CONSULTING MANAGEMENT ENGINEERING EXPERIENCE**

GENERAL OFFICES • CLEVELAND • BULKLEY BUILDING

CHICAGO
City National Bank Bldg., 208 S. La Salle St.

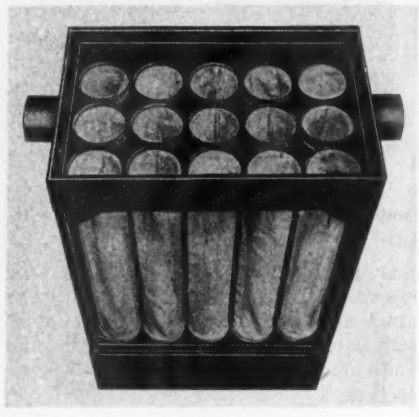
NEW YORK
Graybar Bldg., 420 Lexington Ave.

available: Drilled and tapped for 6-32 screws, threaded shank (6-32 thread) and plain shank for riveting. These, as well as the grooved stud, are provided in various lengths to suit application requirements.

Dust Collector

Applying the principle of reducing the ratio of air volume to filter surface area, a new tubular Dustex dust collector is offered by Dust Filter Co., 160 North LaSalle street, Chicago 1. It is available in three sizes, all of which are portable and self-contained. Unit is adaptable to requirements of buffing, polishing and grinding machines, as well as collecting fine dust arising from other types of machines.

Filter surface area of the collector shown is increased twenty-fold over

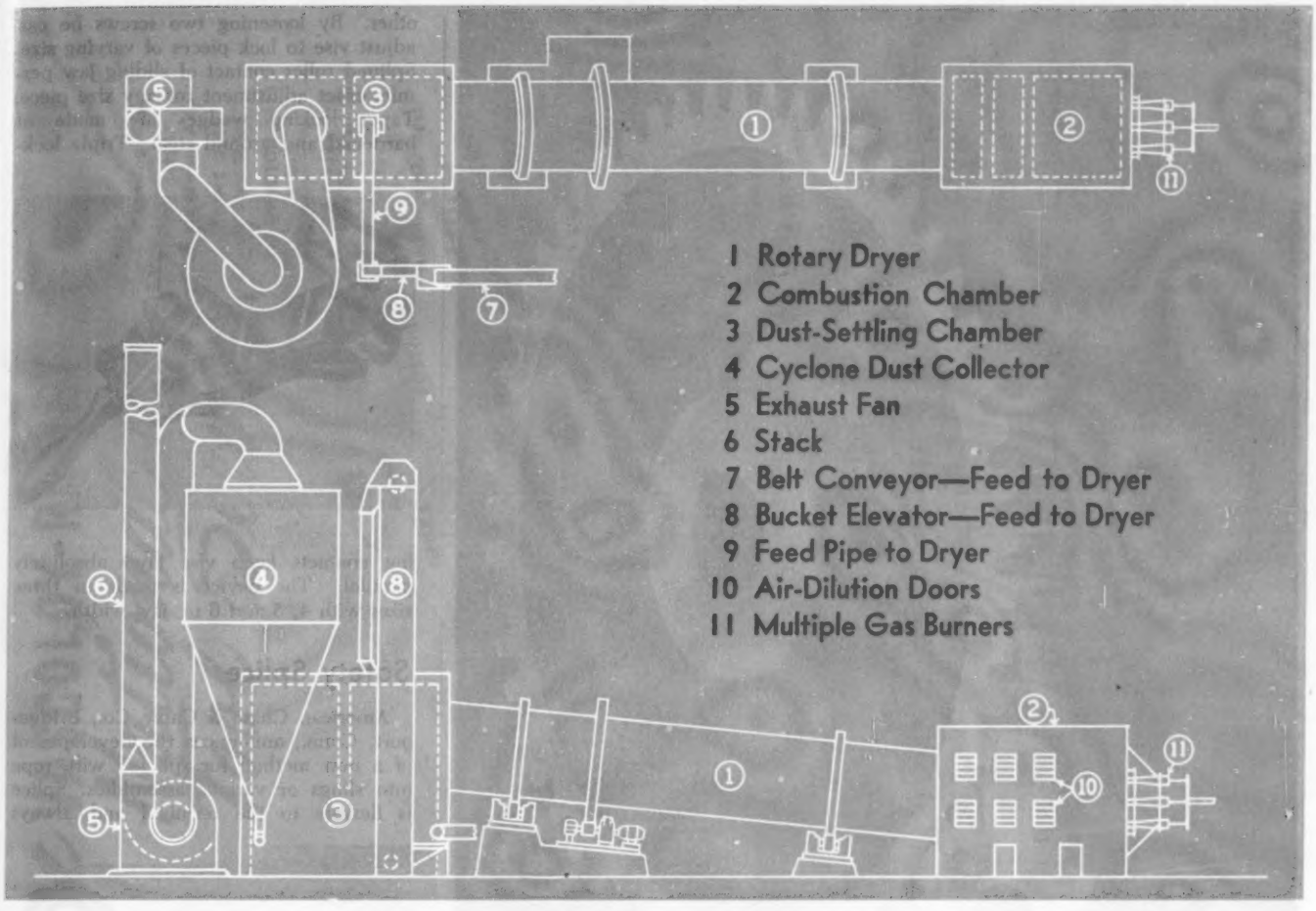


all standard units, the large unit containing 60.8 sq ft of filter surface area. Small units are in proportion. Surface area lessens volume of air drawn through any portion of filter at one time, preventing minute particles from filtering through.

No collector bags are used in the unit. Filter surfaces are tubular in design and bottomless. Dust filtered through them is collected in a pan at the bottom of the unit. These are shaken periodically by a hand shaker. Collector maintains static air pressure of more than 4 in., at a velocity of over 5000 lfm. It is completely fireproof and weighs from 150 to 250 lb. Motors are 3/4 and 1½ hp, 3 phase, 60 cycle, ac.

Production Vise

Universal Engineering Co., Frankenmuth, Mich., announces a new fast operating production vise which operates on the wedge-lock principle. A short 15° pull on the locking lever clamps work in the vise and a second pull of 7° then firmly locks the piece. Pressure is applied to the adjustable jaw through taper wedges. No hammering or other forcing methods are necessary. Interlocking teeth on bottom of slide and gib keep adjustable jaw positively in place, even under heavy cut and vibration. In production work, operator can load with one hand and manipulate vise with



Are You Paying Freight Charges on Water?

If you are shipping large quantities of coal, ore, or any other comparable material containing free moisture you may be overlooking an opportunity to achieve important savings. Besides cutting freight charges a Vulcan Pre-Drying Installation should also effect important economies in your smelting or calcining operations.

The diagrammatic illustration above shows a complete installation recently furnished to a large Mexican corporation for drying water-chilled blast-furnace slag preparatory to its use in the manufacture of hydraulic cement. Outstanding features include provision for delivering a large volume of hot gases to the dryer at relatively moderate temperature—which can be controlled within narrow limits—also for collecting and reclaiming the dust. Other carefully engineered features assure minimum operating expense; especially with respect to flow of material to and from the dryer.

Correspondence regarding the drying, cooling or calcining of any inorganic material is cordially invited. Estimates, constructive suggestions and preliminary designs will be furnished, as far as possible, without charge or obligation.

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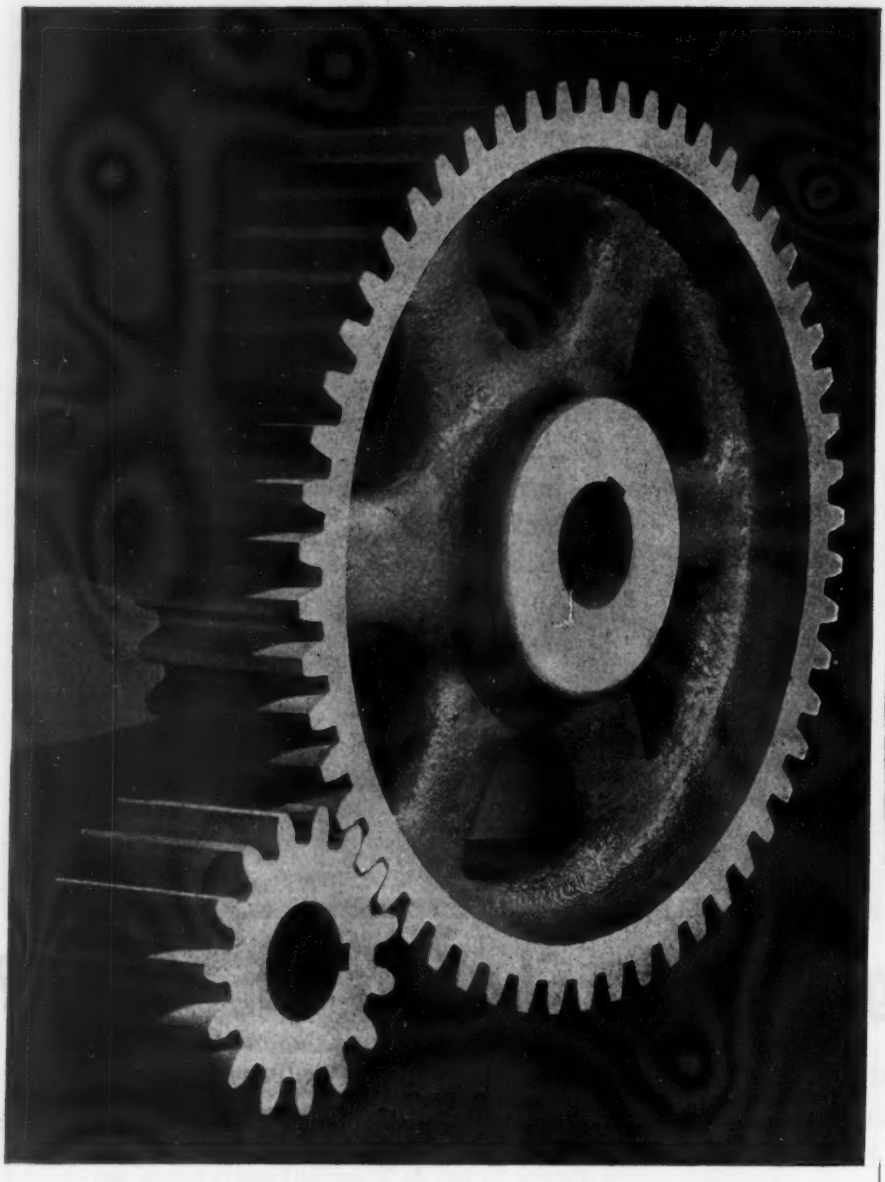

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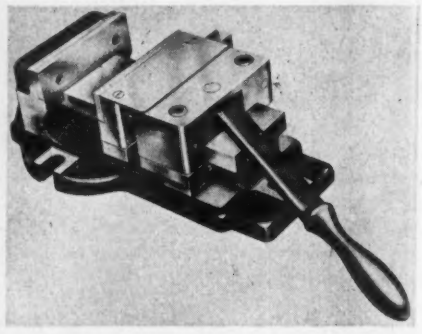
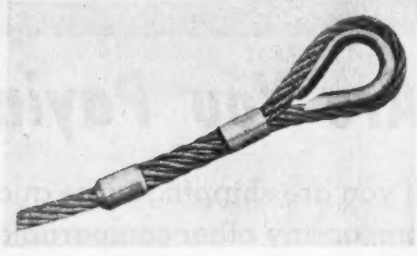
other. By loosening two screws he can adjust vise to lock pieces of varying size. Splined roller contact of sliding jaw permits exact adjustment for any size piece. Taper locking wedges are made of hardened and ground steel. Triple lock-



ing contacts keep vise jaws absolutely parallel. The device is made in three sizes with 4, 5 and 6 in. jaw width.

Safety Splice

American Chain & Cable Co., Bridgeport, Conn., announces the development of a new method for splicing wire rope into slings or various assemblies. Splice is flexible to the terminal and always



develops 100 per cent of rope's strength. Acco-Loc safety splice does not distort rope structure and maintains equalization of stresses in all strands. The splice applies the load stress in direct line with pull of load. It has no seizings to loosen, unravel or get in the way. It is wide open for visual inspection at all times. It may be used with any standard fitting, hook, ring, shackle, thimble, etc. and when sling or assembly is retired such fittings may be salvaged and reused.

Automatic Rotary Cutoff

Pines Engineering Co., Aurora, Ill., announces a completely automatic rotary type cutoff machine for ¾ to 5 in. OD tubing or 4 in. piping. It is equipped with a hollow spindle through which tubing is fed into a self-centering hydraulically actuated automatic chuck. Two tool holders are mounted on a face plate carried on spindle. Pressing the start button begins the automatic machine cycle. Tube is advanced by power feed rolls and strikes an air operated target stop for positioning the end of tubing for length, chuck closes, power feed rolls are stopped and target stop is pulled clear of the end of tube. Tools

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- NEWSTEAD 3110 — 4030 Chouteau Ave.
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- 3-2905 — Martin Building
- 4-5652 — Safety Engineering & Sup. Co., Inc., 407 North 24th St.
- 2-2173 — Oliver H. Van Horn Co., Inc., Spring & Fannin Streets
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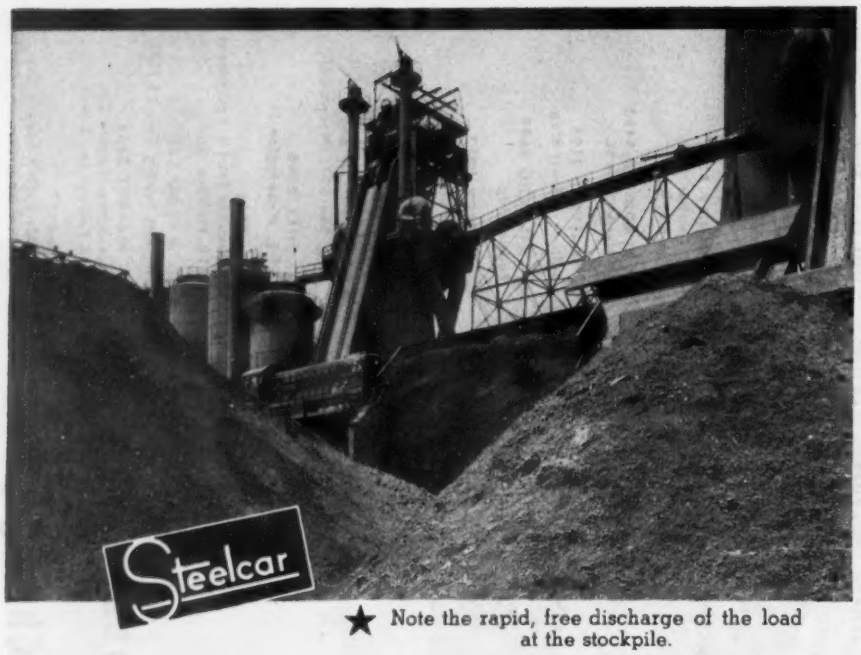

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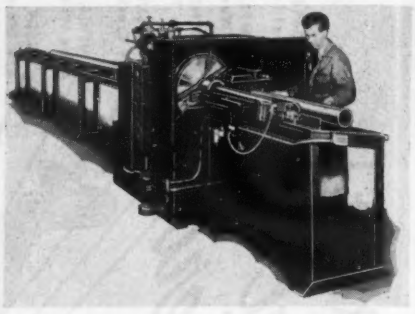
then advance simultaneously by cams on a sleeve over outside of spindle until they strike tube. A speed control valve regulates feed of tools through tube wall. An adjustable limit switch reverses tools after cut is completed.

Chuck then opens, power conveyor



again starts to feed tube through the spindle, pushing out the cut piece which rolls down the table and strikes a flag switch which brings the automatic target stop back into position.

Lifting Clamp

Known as Renfroe, a new type of clamp for lifting steel plate is being marketed by Paul Henry Co., 2037 South La Cienega boulevard, Los Angeles. The

use of cable sliding through rings or guides to actuate the gripping cam is eliminated. Through the action of the gripping cam shackle, work is gripped instantly and firmly the moment tension is applied to lift by crane even though body of the clamp is in a horizontal position.

There is an inserted swivel jaw opposite gripping cam of the clamp. In conjunction with the gripping cam, swivel

SIMPLEX

The shop which builds a variety of products in varying size lots, needs something much more flexible than the conventional type of precision boring machine. It must be able to handle jobs both large and small with a minimum of set-up and change-over time. It must be quickly aligned, equipped with an accurate method of spacing holes and a quick means of changing speeds and feeds.

THE BORING MACHINE FOR A THOUSAND JOBS

A SIMPLEX 3U Knee Type Precision Boring Machine is here shown with an indexing fixture for precision boring several parts in a heavy transmission. The hole sizes differ, so a quick means of changing speed is of great advantage. Various fixtures are used which can be made of the most desired proportions and the machine adjusted to suit the work. Boring and facing feed changes are quickly and conveniently made by means of the star knobs on the bed. All controls are within the operator's easy reach. One of the most valuable features is the fact that when once set up for a job, operation is reduced to loading and unloading the work and pushing the starting button. Let our representative study your work and tell you more of the many advantages of these advanced designs.

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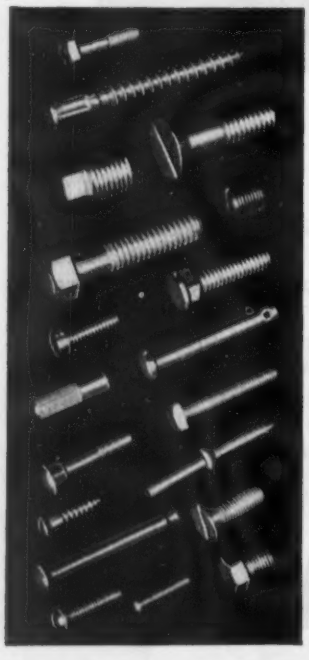

Elco screws and bolts . . . though insignificant in relation to the size of the completed product on which they're used . . . play a major role in production and assembly. Literally millions of them, of every conceivable shape and size, find their way into countless items for both war and peace.

The versatility of Elco screws and bolts is matched by the Keystone wire from which they are made. Whether the needs call for special analysis or what-have-you, Keystone delivers quality wire that "fills the bill."

Soon, we hope, Keystone wire will be available for civilian production in greatly increasing amounts.

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Special Analysis Wire for All Industrial Uses

SAMSON SPRING WIRE

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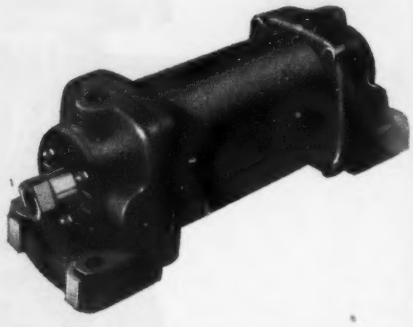
jaw provides a deeper and more secure bite on plate. Clamps are available in 1, 1½, 3, 5, 10 and 20 ton capacities.

Air Cylinder

A new double-acting nonrotating air cylinder is announced by Gerotor May Corp., 444 Tacoma avenue, Logansport, Ind. Keeper ring design assures leakproof construction and permits covers to be rotated to any position for convenient location of pipe connections.

These cylinders can be used for 150 lb air and 300 lb oil and water service. Those used for oil hydraulic service are obtainable with auto type piston ring

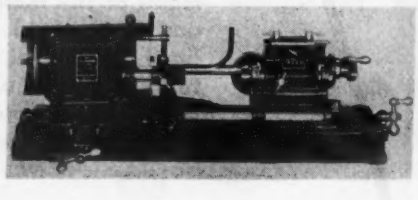


construction. Self-adjusting composition packings are used for cups and piston rod.

Other features include: Large pipe connection; ample bronze rod guide; oversize alloy piston rod; heavy duty piston assembly and heavy duty alloy covers. These cylinders are available in seven standard mountings, in twelve diameter bores, in any length of stroke.

Grinding Attachment

A new grinding attachment for sharpening bent and hook shank taps is announced by Edward Blake Co., 634 Commonwealth avenue, Newton Center 59, Mass. This attachment can be mounted on and removed quickly from any of the company's No. 2 tap grinders. It will permit grinding the chamfer on any bent shank tapper tap up to ½-in.—13 used



on the 1/8, 3/16, ¼, 3/8 or ½-in. automatic tappers, and any hook shank tap up to 9/16-in.—18 used on ¼, ⅜, or ½-in. precision tappers as made by National Machinery Co., Tiffin, O.

Either right or lefthand taps with 2, 3, 4, 5, 6, 8, or 10 flutes may be sharpened on the chamfer with any amount of relief desired. Both precision and speed are attained as the tap grinder is operated in the usual manner when attachment is used.

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Millions of whirling abrasive wheels, trained in war's tough school of precision finishing, each doing a prime job in laboratory, tool room, aboard ship, on production line. And — they're all set and eager to tackle civilian goods when peace machinery is singing again.

Whether it's removing burrs, smoothing edges, squaring surfaces so accurately that the finish can be measured in micro inches, or cut-off work—there's a Chicago ready to do a top-ranking job for you.

VITRIFIED GRINDING WHEELS with a 50-year pedigree. Up to 3" in diameter in various abrasives and bonds including the famous FV Bond.

MOUNTED WHEELS. The largest assortment made with a shape and abrasive to take care of every internal and external finishing job.

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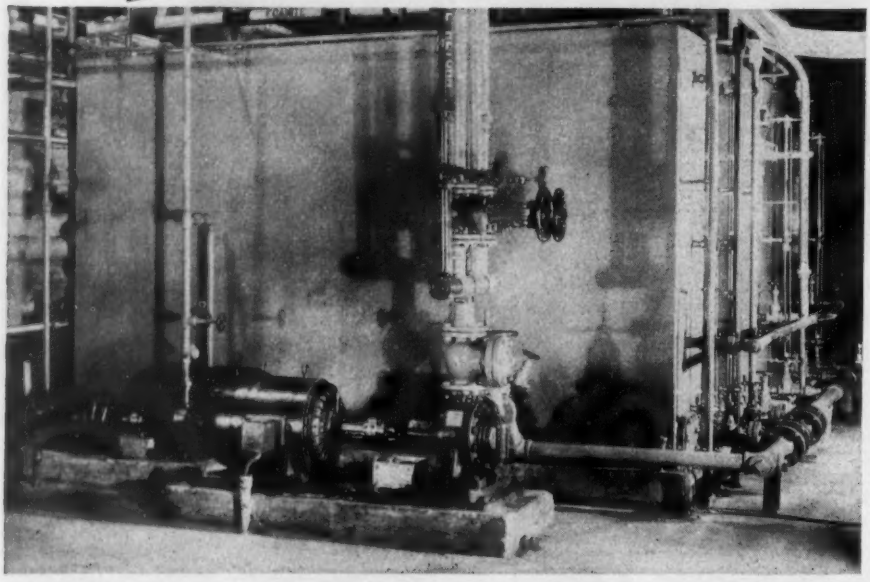
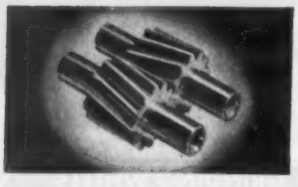
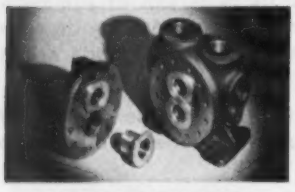


with ROPER PUMPS



FLOATING GEARS REDUCE WEAR. Gears are entirely separate from drive shaft which allows shaft to carry driving loads.

From this Steel Mill's pumping station, arteries of lubrication are extended to giant drives, rack and manipulator bearings, table rollers, and moving parts of screw-down mechanisms to reduce friction to a minimum. Here, Roper Pumps operate year in and year out maintaining a constant flow of lubrication under pressure, protecting precious equipment from undue wear.



REPLACEMENT BEARINGS Four large, high-lead bronze bearings keep shafts in alignment. Easy to replace, at low cost, without disturbing piping or mountings.

In this and in other steel mills throughout America, Roper "Rotaries" demonstrate that dependability and top performance is precision-built into their simple, clean-cut design. You can safely specify Ropers for any job where pressure lubrication is an important factor. They are tailored from standard units to fit individualized requirements. *Ask about direct-drive units that install easily and save space.*

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PUMPS ESPECIALLY ENGINEERED TO FIT YOUR REQUIREMENTS

BUILDERS OF PUMPS FOR MANUFACTURING, MARINE, PETROLEUM, AND PROCESS INDUSTRIES

Fast Hole Production

(*Continued from Page* 115)

of 980 individual holes per hour.

Some idea of the length of tool life obtained can be had from the fact that a tap on the above job will finish 500-800 pieces, some 14,000 to 22,400 holes.

For tapping, the control system differs somewhat from that used in drilling and reaming. Here resetting of the tool is accomplished by reversing the motor and backing the tap out of the threaded hole, done by a reversing switch seen mounted on the column just back of or to the right of the drive mechanism in Fig. 4. This switch in turn is operated by a tapered ball on a spindle which trips lever arms extending from the switch mechanism. These parts can be seen just above the work fixture in Fig. 4.

Drill Sharpening: All the drilling work is done with regular jobber drills purchased from stock. It is interesting to note that experience here with various makes of drills shows that one particular make turns out 50-60 per cent more holes than the next best and is 200-300 per cent better than the poorest tried.

In drilling 0.368-in. diameter holes in $\frac{3}{16}$-in. thick SAE-1010, about 10 pieces with 48 holes each are drilled before the tool must be resharpened—that's almost 500 holes per sharpening. All drills are given a U-shaped point, most of the sharpening being done on a small bench grinder by C. A. Bachman, foreman of the drilling department, who also helped engineer the hole production setups. Davis Tool engineers did all the work in designing and building the setups pictured here in Figs. 1, 2 and 4.

Good Accuracy; Few Rejects: In tapping, the machine operator handles a 10 per cent inspection. In drilling and reaming, the inspection is done by other men than the operators. Rejections run surprisingly low. Usually a lot of 2000 parts will have only 3-4 rejects, reports Mr. Ragland. A typical job of 880 parts checked out with only a single reject. And when it is remembered that there may be up to 48 holes in each piece, this is seen to be a good showing, indeed.

Mr. Ragland says that most rejects occur because the drilling jigs wear and so allow the hole centers to shift. On most drills, the outside diameter shows wear before the point. Of course, this would be expected because of contact against the hardened steel guide bushings.

Davis Tool began with one automatic head in a single drilling setup. It proved so satisfactory that now six of the model H units are in use, including those shown here in Figs. 1, 2 and 4.

How It Works: An automatic head with outer cover removed is pictured in Fig. 7. This is the smallest of three models. Known as Model C, this unit employs a ¼-hp single-phase motor of the series type with a free running speed of 12,000 rpm, full load speed of 5,500 rpm. Immediately adjacent to the motor frame

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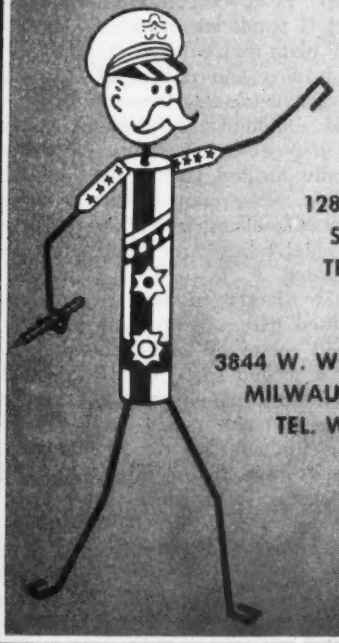

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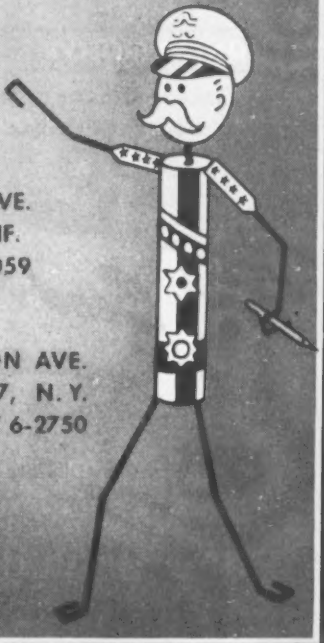

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AN ADHESIVE LIQUID AT LOW TEMPERATURES

SCAIFLUX becomes an adhesive liquid at 160°F. This is an important advantage especially for close tolerance work.

ACTIVE AT TEMPERATURES FROM 900°F. TO 1650°F

The wide temperature range over which SCAIFLUX is active helps you maintain highest quality.

NON-CORROSIVE

Fluxed parts can be stored indefinitely when SCAIFLUX is used, for this flux is non-corrosive.

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SCAIFE

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OAKMONT (Pittsburgh District), Penna.

is the electric brake which stops the unit at completion of the working stroke and thus allows the feeding mechanism to return to "start" position.

Just to the right of the electric brake is the centrifugal feeding mechanism with its radially moving weights and dual cones between which the weights work to provide the end thrust utilized to feed the drill into the work. Endwise movement of the spindle is used to control the "stop" and "return" portions of the working stroke, as will be explained. This model has a ¾-in. stroke of the feeding device, and takes 3/32 to ¼-in. collets.

Five Model C units are employed in the setup pictured in Fig. 6 to drill brass fuze parts from five directions simultaneously. A quick-acting work clamp and automatic work discharge help obtain an output of 12 pieces per minute working two No. 49 drills, two No. 65 drills and one No. 50 drill.

Next larger unit, Model E, uses a constant speed (3450 rpm) ¼-hp, 3-phase 60-cycle motor. This model has a 1¼-in. maximum stroke, accommodates collets from 3/32 to ¼-in. Fig. 5 shows five of these units arranged radially around an indexing type fixture with speed clamps for handling a high output of small parts. This model also uses an electric brake.

Largest unit, Model H, is the type employed on Davis Tool's individual setups, Figs. 1, 2 and 4 and also in the multiple head setup, Fig. 3, where eight Model H heads are mounted radially on a face plate that is tilted at an angle for easy loading and unloading of the fixture. Eight 3/32-in. diameter holes are drilled simultaneously through 7/16-in. of steel in 2 sec in this setup. Work fits in centrally located fixture carrying guide bushings. Note nut with four radial pins for speedily clamping work in the fixture. Individual tubes carry lubricant to each drill point.

These larger automatic drill heads are fitted with a ½-hp, 3-phase 60-cycle 2-speed motor. Working speed is 1730 rpm. A second speed of about 550 rpm is used for dynamic braking to reset the feeding mechanism. Use of the 2-speed motor eliminates the need for an electric brake as used in the other two models and makes for a somewhat simplified head.

Feed Action Explained: Fig. 8 is a section through the Model H head. The force to feed the drill through the work is developed by the weights (156). Two, three, four or six weights are used, depending upon the amount of "push" that the tool can absorb on the particular job at hand. In any case, the weights are positioned around the circumference to balance when running. The action is explained by O. R. Aronson of Govro-Nelson Co., Detroit, as follows:

Weights are free to move radially on the spacer (166). Sloping outer surfaces of weights contact the cup (146) which rotates in a fixed position and the cup (136) which is free to move lengthwise on the quill (076). The sliding cup (136) also carries the two latches or dogs (126) on pivot pins (186). These two latches ex-

HELPFUL LITERATURE

1. Pilot Valves

Vickers Inc.—24-page illustrated bulletin No. 44-7 describes line of pilot valves for oil hydraulic systems. Rotary, plunger and solenoid operated plunger type valves for use as initial or sequential control of other valves or elements are covered.

2. Speed Reducers

Universal Gear Corp.—8-page illustrated "Universal Uses of Our Units" shows applications of heliocentric and helical gear speed reducers which range in capacity from 1/8 to 10,000 horsepower.

3. Industrial Paints

U. S. Gutta Percha Paint Co.—16-page illustrated bulletin "Color for Industry" discusses advantages and disadvantages of using colored paints in finishing interiors of industrial plants. Color for safety, seeing, maximum illumination and other purposes is covered.

4. Small Drills

Whitman & Barnes—4-page illustrated booklet lists specifications and prices of Hercules precision twist drills and watchmakers (flat) drills in both straight and oversize shank models.

5. Air Compressors

Worthington Pump & Machinery Corp.—4-page illustrated bulletin No. H-620-B21C describes single-stage and two-stage, tank mounted Feather Valve air compressors. Specifications are given.

6. High-Cycle Accessories

Pesco Products Co.—10-page illustrated manual "Aircraft Accessories for 400-Cycle Motor Operation" is preprint of paper presented before section meeting of S. A. E. by Ray G. Holt, sales engineer. Applications, performance charts and descriptions of high-cycle equipment are presented.

7. Jigs

N. A. Woodworth Co.—16-page illustrated Cone-Lok Jig catalog No. 45-J describes operation of jig and explains six new features. Data sheets and dimension drawings of three styles, up-clamp, bridge and three-post types, are included.

8. Flexible Couplings

Union Chain & Mfg. Co.—16-page illustrated bulletin No. FC-1 lists specifications of roller chain and silent chain types of flexible couplings. List prices, dimensions, horsepower ratings and service factors are tabulated. Details are given on split aluminum covers and finished roller chains.

9. Hoists-Trolleys-Cranes

Wright Mfg. Div., American Chain & Cable Co.—100-page illustrated catalog No. 12-D describes and gives prices of complete line of hoists, trolleys and cranes, together with specifications, dimensional drawings, and cutaway pictures of units. Parts lists and accessories are covered.

10. Industrial Furnaces

Tate-Jones & Co.—78-page illustrated sectionalized file folder type catalog contains descriptive and technical information on reheat and heat treating furnaces, fuel oil and its use, gas as an industrial fuel and engineering data. Auxiliary equipment is also covered.

11. Sander and Abrasive Head

Vonnegut Moulder Corp.—8-page illustrated bulletin No. 53 is descriptive of new brush-backed sander and abrasive head which is designed especially for finishing irregular surfaces. Abrasive strips feed up between bristles of brush segments mounted on wheel and readily conform to practically any contour. Head can be used on standard grinders and polishing stands.

12. Bright Nickel Plating

Udylite Corp.—8-page illustrated bulletin "The Udylite Process of Bright Nickel Plating" discusses advantages, applications, procedure and other details of this process. Typical plating equipment and accessories for bright nickel plating are described.

13. Bar Shears

Thomas Machine Mfg. Co.—4-page illustrated bulletin No. 317 gives general specifications of steel plate bar shears. Table of punching pressures for round holes is included.

14. Electric Furnace

Thermo Electric Mfg. Co.—2-page illustrated bulletin "Temco Electric Furnace Model OFE" includes information and specifications of this model. Unit is fully described and price is listed.

15. Metal Cleaning Units

Optimus Equipment Co.—4-page illustrated bulletin No. 4E1 describes engineering and manufacturing of washing, rinsing, pickling and drying equipment for metal parts. Small portable units and large automatic installations are covered.

16. Floor Machine

G. H. Tennant Co.—2-page illustrated bulletin No. 81.5-C describes model K industrial floor machine. Features and dimensions are covered. Machine can use steel wool, sanding rolls or steel wire brushes.

17. Copper Plating

United Chromium Inc.—6-page illustrated bulletin on Unichrome alkaline copper plating describes process which is claimed to afford fast production of smooth, ductile deposits. Characteristics of plating, equipment, procedure, plating time and other data are presented.

18. Plug Gages

United Precision Products Co.—14-page illustrated catalog No. 42 describes complete line of precision plug gages. Details are given on precision pin sets in number drill sizes, letter drill sizes and fractional inch sizes. Standard and special plugs gages are described.

19. Business Forms

United Autographic Register Co.—Portfolio contains scores of actual samples of business forms used by industrial and business firms. Advantages of Uarco system continuous forms, E-Z Outs and autographic registers and forms are presented.

20. Surface Cleaning

Turco Products Inc.—4-page technical data bulletin No. A-326 "Turco Materials for Shipbuilding" discusses labor saving chemical methods for cleaning, paint stripping and corrosion removal.

21. Wire Handles

E. H. Titchener & Co.—24-page illustrated bulletin describes many types and sizes of wire handles, both standard and special shapes. Style number, die number and wire size for standard handles are given.

22. Template Dies

Algoma Products—4-page illustrated folder "A Word to the Wise Concerning Dies" presents advantages of Algoma template dies. Features include self-stripping, self-alignment, heat treatment and mounting.

23. Nuts & Bolts

Triplex Screw Co.—22½ x 35-inch wall chart shows various types of cap screws, bolts, finished nuts, semi-finished nuts and hot pressed nuts. Dimensions, weight and prices are listed for each type. Included is table of discounts.

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24. Materials Handling

Towmotor Corp.—Data file of Towmotor materials handling equipment includes catalogs and bulletins illustrating and describing applications of industrial trucks, available accessories and operating data and specifications of various types. Servicing and maintenance features are covered.

25. Welding Rod Holders

Tweco Products Co.—12-page illustrated catalog No. 1945 describes Hol-Grip welding electrode holders, Redhead ground clamps, hooks and wedges, Sol-Con and type DM cable connectors, Sol-Con machine terminals, Tweco-lugs and jig and fixture clamps. Specifications and prices are given.

26. Torque Motors

B. A. Wesche Electric Co.—8-page illustrated bulletin 8a17 describes Welco custom built electric motors for special applications. Features and typical units are shown. Convenient sheets are included for requesting information to meet specific needs.

27. Steel

Ziv Steel & Wire Co.—84-page pocket size booklet "Ziv's Quality Steels" gives information on characteristics, applications and heat treatment of company's carbon alloy high speed tool and die steels. Weight tables of rounds and flats and section on heat treatment complete book.

28. Machine Cutting Tips

Air Reduction Sales Co.—12-page illustrated bulletin No. ADG-2008 describes AIRCO "45" and "45M" High Speed tips for fast machine gas cutting. Improved quality and narrower kerf are claimed. Typical setups and engineering charts are included.

29. Seamless Tubing

Wolverine Tube Div., Calumet & Hecla Consolidated Copper Co.—22 x 32-inch wall flow chart illustrates and describes processes used in making seamless nonferrous tubing. Photographs and schematic drawings explain process.

30. Abrasive Products

Abrasive Co.—4-page bulletin No. ESA-72 presents this company's new standard marking system for grinding wheels and other bonded abrasives. System covers kind of abrasive, abrasive type, grain size, grade, structure, bond type and manufacturer's record. Additional wall chart of markings is also included.

31. Electric Motors

Allis-Chalmers Mfg. Co.—24-page illustrated pocket size handbook "A Guide to Wartime Care of Electric Motors" relates precautions to take to increase life and efficiency of motors. Chart lists common symptoms, causes and cures of many motor ailments.

32. Laminated Lignin Plastic

Wales-Strippit Corp.—4-page bulletin No. 6 describes properties and uses of Walesite oil resistant lignin plastic board. Physical properties and methods of working are given. Plastic is used for Wales plate sets of plate set system and templates to mount Wales hole punching and notching units.

33. Aluminum Tubing

Reynolds Metals Co.—8-page bulletin 17-A lists specifications, composition, dimensional tolerances, internal pressures and general information on aluminum tubing. Available sizes and sections, alloys, tempers, finishes and identification are discussed.

34. Resistors

Ward Leonard Electric Co.—32-page illustrated bulletin No. 25 describes various types of resistor units and gives sizes, resistance values, mountings and closures. "How to Select the Right Resistor" is a feature.

35. Roll Forming Machines

Tishken Products—72-page plastic-bound catalog illustrates and describes numerous roll forming machines for zinc, steel, bronze, aluminum and other metals. Specifications and typical rolled sections are shown. Flattening machines, bending machines, bulldozers, slitting machines, cutoff machines, stock holders and some special machines are also described.

36. Production Facilities

York Safe & Lock Co.—48-page illustrated plastic-bound catalog "Can You Utilize These Facilities in Your Postwar Production?" describes engineering, planning and production facilities of company's three plants for postwar production. Products manufactured during the war and available machinery and equipment are covered.

37. Ventilating Fans

L. J. Wing Mfg. Co.—8-page illustrated bulletin No. F-9 describes new Wingfoil fan wheel, straight line duct fan and elbow type duct fan. Many types of installations are shown. Capacity tables, dimensions and engineering data are included.

38. Electronic Controls

Wheelco Instruments Co.—12-page illustrated bulletin No. Z6300 contains condensed listings of company's principal equipment, including temperature control instruments, indicating pyrometer controllers of universal and surface types, input controllers, program controllers, portable potentiometers, Flam-otrols, indicating pyrometers, indicating resistance thermometers and accessory equipment.

39. Weld Spatter Preventive

Wolfe-Kote Co.—Five illustrated data sheets present full information on Anti-Spatter welding spatter preventive, No. 20 Tri-Flux for all metals except stainless steel and Monel metal, Carbon Cleen for cleaning aluminum cores and No. 5 Tri-Flux for soldering.

40. Packing

Weatherhead Co.—8-page illustrated bulletin "Weatherhead T-Ring Packing" describes development and application of this type packing for seals in cylinders, swivel joints, struts and other applications where pressures are above current practice. Design features, advantages, test data and methods of installation are covered.

41. Aluminum Welding & Brazing

Aluminum Co. of America—110-page illustrated wire-bound pocket size booklet "Welding and Brazing Alcoa Aluminum" presents specific instructions for using commercially important processes. Various methods of gas and electric welding and newly developed joining method for furnace, torch and dip brazing of aluminum alloys are covered.

42. Wire Rope Shears

Watson-Stillman Co.—8-page illustrated bulletin No. A-6, third edition, describes hand and hydraulically operated shears for cutting commercial grade wire rope, flat and round bars and varying shapes. Specifications, capacities, spare parts and prices are given.

43. Surface Coating

Wailes Dove-Hermiston Corp.—4-page illustrated folder No. 345 describes Bitumastic No. 50 thick film coating for surface protection of metal and concrete surfaces against corrosive and deteriorating conditions. Applications and list of materials to which it is impervious are included.

44. Springs

Accurate Spring Mfg. Co.—36-page illustrated "Handbook of Technical Data on Springs" contains generally usable data and information. Design data on extension, compression and helical springs are given. Tables on load deflection and conversion formulas for types of ends are included. Methods of ordering are also covered.

45. Corrosion Resistant Chain

Youngstown Welding & Engineering Co.—4-page illustrated bulletin No. C145 relates benefits of WELDCO Monel, Inconel, nickel and stainless steel chain. Link specifications and tables of recommended assembly of single and multiple sling chains are included.

46. Duplicating Equipment

Addressograph-Multigraph Corp.—12-page illustrated booklet "Pennies and Seconds and Your Business Forms" describes methods for Systemat duplicating, short run duplicating, long run duplicating and Multigraph duplicating, covering all types of office and industrial forms.

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tend through slots in the quill to engage the key (116) which in turn moves the spindle (066) lengthwise to feed the drill into the work.

As the operator steps on the treadle switch starting the driving motor in the head, the entire mechanism within the housing (016) starts to turn. As it comes up to speed, centrifugal force causes the weights to move radially to some position such as that indicated in Fig. 9. Any radial motion involves separating the two cups as the weights move outwardly against the inner surfaces of the cups. This action drives the spindle carrying the drill down to and through the work, the dogs (126) transmitting the cup movement to the spindle.

As the drill goes through the work, the dogs or latches will have moved lengthwise to a point where they will engage the inner end of the sleeve (096) which will trip the latches by causing the forward end to move outward radially. This in turn releases the spindle so spring (046) can return the spindle (066) by pushing on the screw (176) threaded into the end of the spindle. The spring (366) takes up the shock of this return motion.

Upon return of the spindle, screw (176) moves the actuator rod (606) which extends through the hollow shaft of the motor to actuate a micro-switch that disconnects the motor from the power line and sets the electric brake on Models C and E; on Model H, it throws the motor into low speed.

The resulting slowing down of the motor reduces the centrifugal force exerted by the weights, allowing the cup spring (036) to return the sliding cup to its original position. Then the latch spring (266) forces the latches or dogs into the position shown in Fig. 8 where they engage the spindle key (116) ready for the next drive.

Examination of the mechanism described above reveals careful design. Note that the ring spring (206) absorbs the shock of the driving action as the drill emerges through the work and goes free. Spring (366) takes up the shock of the spindle return.

Ample Adjustment: Maximum length of stroke varies from ¾-in. for the small model to 1¾-in. for Model H. Where a full stroke is not wanted, the two locknuts (086) on the threaded end of the quill (076) are adjusted to move sleeve (096) in further, causing the latches to be tripped by the inner end of the sleeve before the spindle has traveled the full stroke. This makes it possible to set the length of stroke at any point desired within the total range available.

Note that this adjustment is obtained by changing the distance the drill penetrates into the work, the spindle returning to the same upper point regardless of the stroke setting. In operation, these units easily hold the depth setting to within plus or minus 0.005-in.

The force exerted in feeding the drill can also be varied considerably. This is done by changing the number of weights (156) used between the two cones. Since

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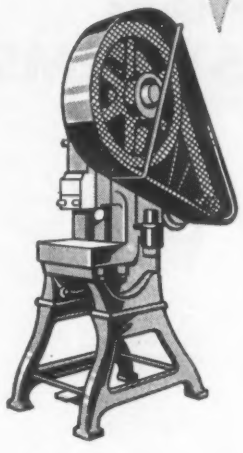

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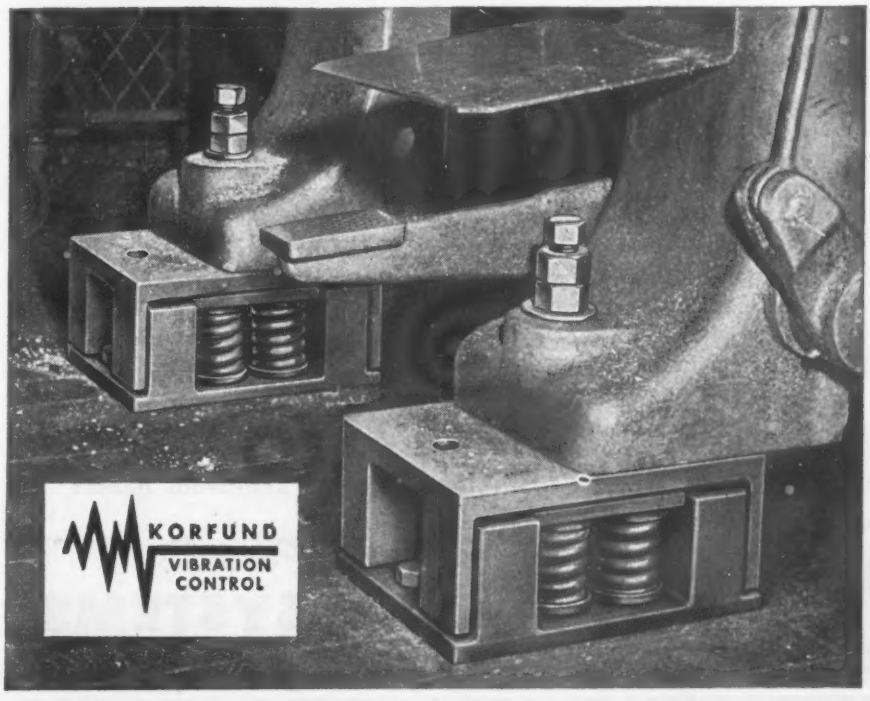

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Are there operations in your plant where makeshift means for coolant application are being used? Are you getting the most out of taps, drills, milling cutters, etc? Remember you *will* get the *most* out of every machine with a Gray-Mills Coolant System. They are available in a variety of models, with pans and fittings for every requirement. Send for complete informative bulletins today!

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there is room for six weights, this number provides maximum "push"—some 300 lb for the Model H. But two, three or four weights can also be used instead of the full six, giving other values of feed pressure.

In the small unit, a further automatic feed pressure adjustment is inherent. Since the feed pressure exerted by the head varies as the square of the speed, as well as the number of weights, the use of a series type motor here provides a further controlling action. As the drill encounters a tough spot, the added torque required slows down the motor, in turn greatly reducing the feed pressure. This then allows the drill to "float" against the work until tough spot is passed.

Mr. Aronson explains it is this feature that accounts for the success of these units in drilling small holes and in controlling drill breakage.

He also points out that all parts of the feed mechanism are heat treated and ground to finish dimensions, enabling all parts to be exact fits and permitting perfect interchangeability.

Mock Plane Checks Electrical System

Before flying an airplane equipped with a 400-cycle, alternating current power system, it is desirable to test the system as a whole on the ground, as operation of each generator, motor, switch, relay, wiring, etc. is affected by the operation of all members of a group. For this reason the Army Air Force has established a mock-up of a 4-engine plane, set up on stands, on which various components of the alternating current system may be tested as provided by manufacturers. Provision is made for driving the 40 kva ac generators, which are already available from manufacturers through gears or through various hydraulic constant-speed drives as perfected. It includes wiring and controls laid out much as in the airplanes, and to them are connected many actual alternating current motors, motor-generator sets, radio, and other loads. From a control stand the flight engineers' controls are simulated so the plane may be "flown" while all elements of the electrical system are under close observation.

In addition to checking performance of the generators, synchronizing apparatus, regulators, circuit breakers, and motor-generator sets newly designed for 208-v, 400-cycle operation, the study is probing such questions as whether automatic synchronizing is necessary, sharing both real and reactive loads, the rapidity with which short-circuits must be cleared to avoid motor stalling, co-ordination of protective devices after a fault condition, and many others.

Essential elements of new alternating current systems for planes are assuming physical form. On-the-ground testing of the elements into a single system is said to mark another step in progress toward successful electrical systems. Westinghouse Electric Corp., Pittsburgh, Pa., has made many of these units.

FACTS AND FIGURES ON NEW AND EXPANDED FACILITIES OF THE STEEL INDUSTRY ARE NOW REVEALED IN . . .

"Steel Expansion for War"

By W. A. HAUCK

[An official report by Mr. Hauck for the War Production Board]

192 pages of pertinent data on both industry and government financed projects. Detailed schedules on capacities, location and cost. Including 148 photographs.

• Mr. Hauck has been with the Steel Division since its inception in June, 1940, then under the National Defense Advisory Commission (predecessor to WPB). Assigned to the task of expanding and balancing steel capacity for war, Mr. Hauck has inspected both large and small plants all over the United States. He prepared several official reports which lead to the addition of 10,000,000 tons of integrated steel capacity, plus over 5,000,000 tons of capacity by the expansion of existing facilities.

"STEEL EXPANSION FOR WAR" is an official report on this gigantic undertaking prepared for the War Production Board and other government agencies. A large part of the data will be presented before the Senate when it takes up the problem of disposing of billions of dollars worth of surplus government-owned war plants.

Much heretofore unpublished information is presented on new and revamped facilities of hundreds of plants, including those in the ore, ore transportation, coal and coke, refractory, ferro alloy, scrap, foundry and forging industries. The report provides details on types of products, capacity increases, plant locations, costs, etc. Included are 148 photographs, plus charts and tables.

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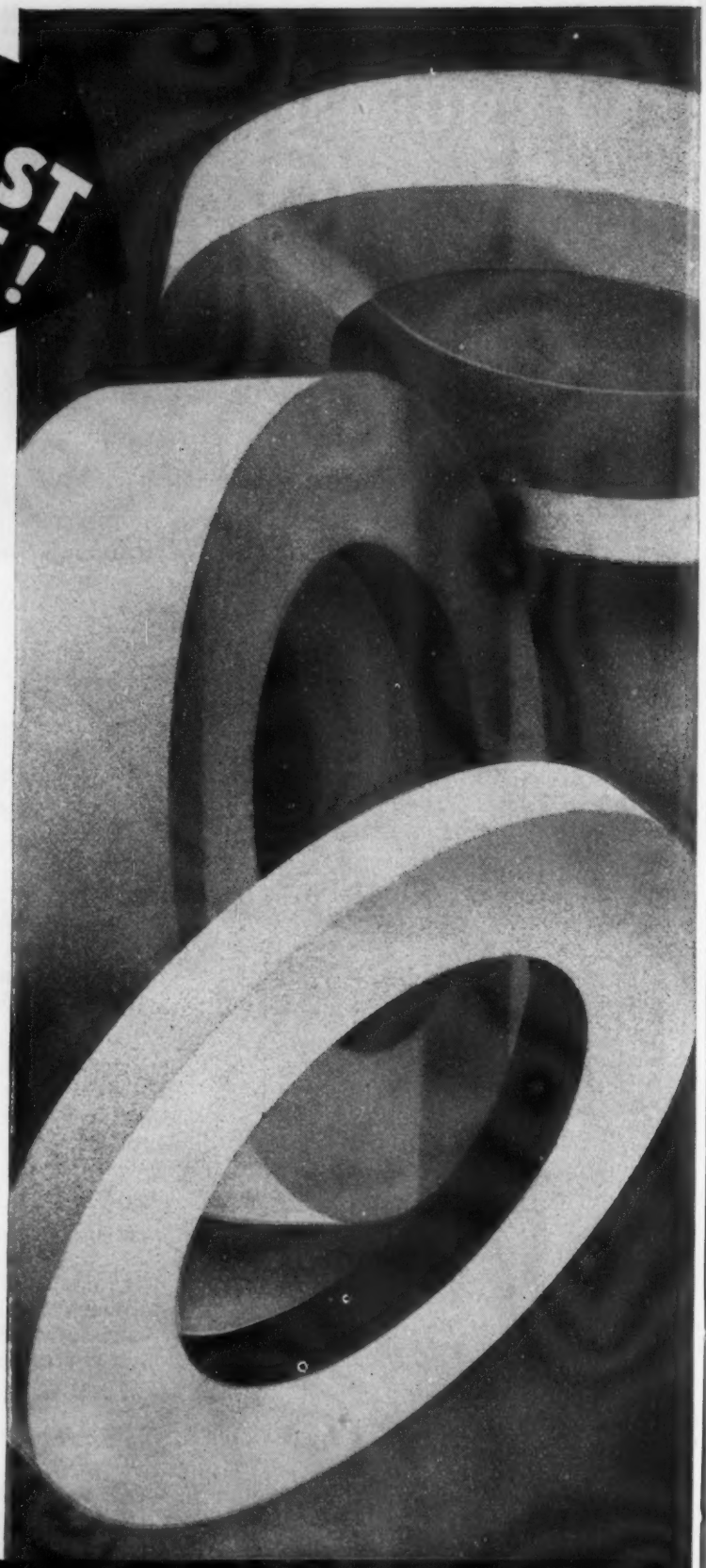

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THE
STERLING GRINDING WHEEL DIVISION
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THE WHEELS OF INDUSTRY

Hardening High Speed Steel

(*Concluded from Page* 122)

and in the very near future the well-equipped hardening room may require a refrigerator as much as it now requires quenching baths.

The publication of "The Transformation of Retained Austenite in High Speed Steel at Sub-Atmospheric Temperatures", by P. Gordon and M. Cohen, *Transactions*, American Society for Metals, September, 1942, has stimulated a great deal of work on sub-zero treatment of high speed steel. The statements recorded in this article cover only the first investigation by the author. In some cases they may not coincide with results obtained by other investigators, but this does not mean that any investigator's results are in error. It simply points out the sensitivity of high speed steel to refrigeration, and the effect the entire treatment may have on the results of the refrigeration process.

Fig. 1, of accompanying illustrations, shows microstructure at 1250 diameters of high speed steel after treatment No. 1, unrefrigerated. Fig. 2 shows microstructure of high speed steel subjected to treatment No. 3, refrigerated between tempering operations. Fig. 3 is a cross-section of refrigeration unit showing methanol and dry ice surrounding cold chamber.

Sealer Improves Spot Welded Joints

Three types of a new sealer, made for plates that are spot welded together, may be applied by flow gun, brush or spray, Tests have been made with a 3½ x 10 x 10 in. box made by spot welding all seams at a 3-in. pitch, using this sealer in the joints and filling the box with water. Sample lap joints were made up, X-rayed and sheared into tensile specimens. Other panels using the same joint were run through the paint system with or without bonderizing and left in a salt spray for 2 weeks.

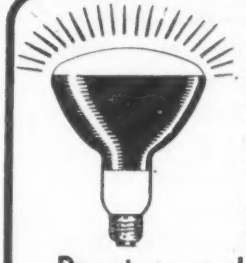
The specimens were said to have tested for a tensile strength to 2600 lb. X-ray showed all good welds, and the box did not leak throughout the 2 weeks' test. The sealing compound also was said to have given no difficulty in the paint process and stood up satisfactorily in the salt spray test. Spot welded panels, put through the complete bonderizing cycle, including a 3 min dip at 210° F in 2.5 per cent caustic potash, revealed no deleterious effects on the material in the seam. The material itself is said to have no corrosive effect on metals. Spot welded panels sealed with spot weld sealer show protection at the seam when kept in 100 per cent relative humidity at 100° F for 1 week.

Presstite Engineering Co., 3900 Chouteau, St. Louis 10, states that all three types of spot weld sealer have been proven to have high resistance to dilute acids, alkalies and mineral oils.

17 REASONS WHY IT'S DIFFERENT

AND EVERY REASON IS INDICATED BY OUR PATENT CLAIMS ON THIS DESIGN

PENETRAY



Reduced glare is an important reason for your selection of a Specific Near Infra-red source. Next, for baking, drying and evaporating, a radiant source peaking between 13,000 and 14,000 Angstrom Units is most desirable. These are two definite reasons for your use of Penetray.

Penetray production is unusually costly because of filament and construction detail. This, in our opinion, is necessary to a quality product. Lamp life and efficiency is imroved - resistance to vibration being maximum. A nonex arbor protects against softening of glass and resulting distortion of filament due to sagging. Radiant energy is emitted in both the vertical and horizontal.

Honestly, now, don't you want to know more about this new product and the prospect of improved results?

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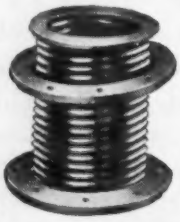
. . . that's a familiar refrain among engineers and production men in every field—diesel, oil, power, machinery, steel and many others. It's not hard to understand why REX-WELD has achieved such high standing with users of flexible metal hose!

National Supply Company Diesel with RW-89 All-Steel Diesel Exhaust Unit.

For industrial men know that REX-WELD Flexible Metal Hose provides an added measure of strength and dependability for heavy-duty jobs. That's because it is fabricated from strip metal by a precision autogenous welding process that makes *a weld stronger than the tube.* In addition, C. M. H.'s advanced "50-50" principle of construction produces deep, uniform corrugations with less working of the tube walls. The result—flexible metal hose with greater inherent strength . . . extra flexibility . . . longer service life!



RW-89 Diesel Exhaust Unit.

They know, too, that REX-WELD has the ruggedness to withstand extremes of pressure and temperature. That, in addition, it is leakproof in conveying searching fluids; pressure-tight; and able to withstand prolonged vibration, flexing and bending.

Small wonder, then, that when the job calls for flexible metal hose—industrial men say, "Let's use REX-WELD!"

Consult C. M. H. about how REX-WELD can meet *your* requirements.

Flexible Metal Hose for Every Industrial Use

ARMY E NAVY

CMH

CHICAGO METAL HOSE CORPORATION

MAYWOOD, ILLINOIS

Plants: Maywood and Elgin, Ill.

Testing Welded Structures

(*Continued from Page* 126)

representative data, for consideration.

Specimens: Tee-shaped specimen like those in Fig. 2 is formed. It will be seen that a rather large plate is used in order to ensure sufficient mass to approximate the quenching ability of a structure of large size, and to provide the welder with several practice increments before reaching the area which is to be tested.

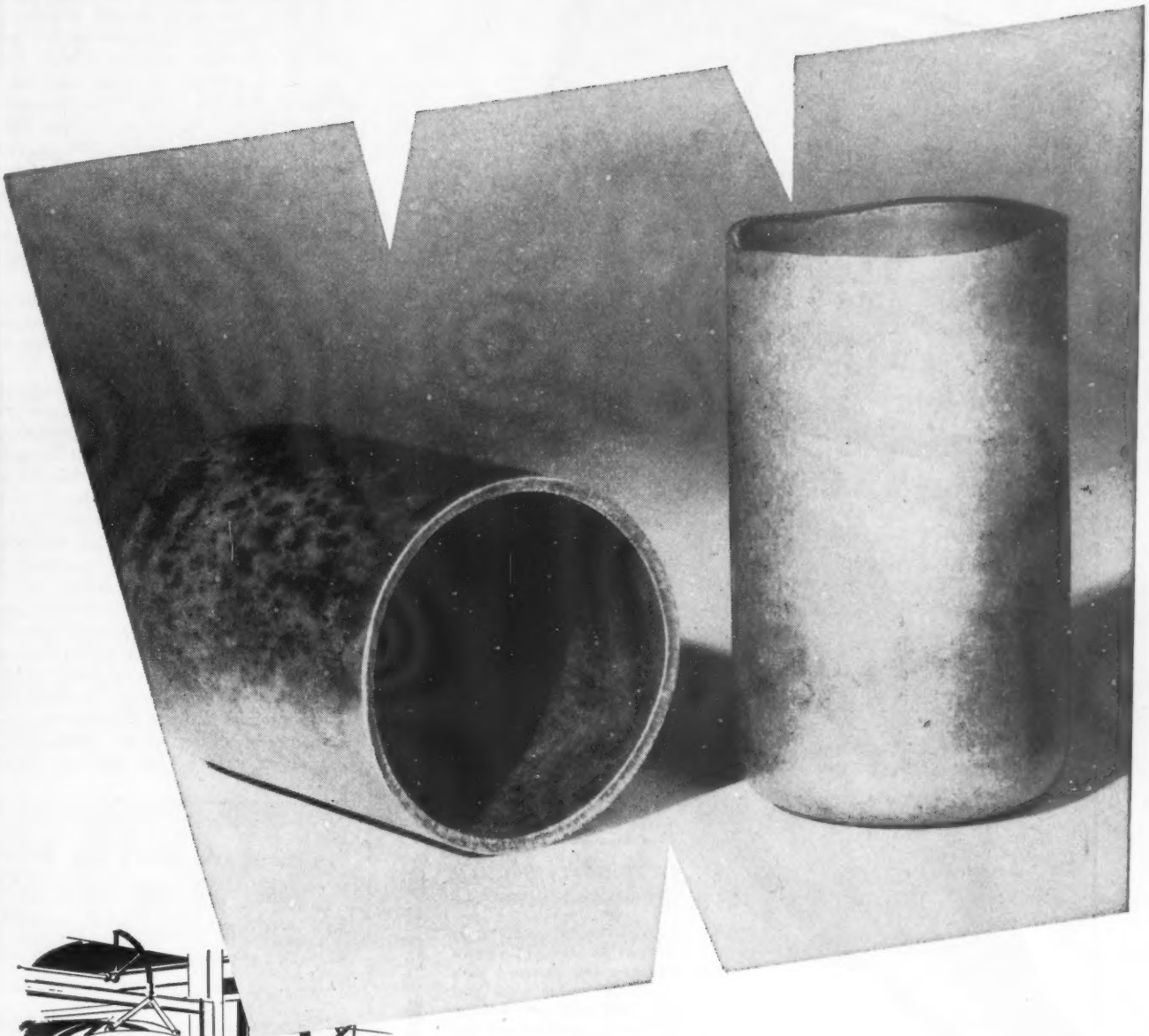
Plates: In the original standard plate from which the different joints were cut, it will be seen that two joints were provided to be welded in the as-rolled condition, and two in the normalized. These four joints were so arranged that the length of the specimens was parallel to the direction of rolling and the weld transverse thereto. This type is called a longitudinal specimen and is the usual type. Recently considerable work has been done on transverse specimens, that is, specimens in which the length of the specimen is transverse to the direction of rolling. When such a joint is desired, it can be cut.

Operations Before Welding: All plates and stems are automatically torch cut to size. For normalizing, plates are held at 1675° F for 1/2-hr, followed by cooling in air. The stem is tacked to the plate only at the ends so that no heat effect from the tacking exists in the regions to be tested. The exact length of the increments is marked with chalk on the plate before welding, as shown in Fig. 2.

Welding: The greatest care is used in manual welding to attain maximum uniformity. All welds are deposited in definite increments. Preliminary experiments were conducted in which welds of the actual average size used by the Navy in some of their tests were made and the length of electrode consumed in making a specific length of weld was determined. Results of these tests were used to establish a volume control of the size of weld. This is accompanied by controlling length of electrode consumed per increment. Original welding schedule was to deposit the 2 11/16-in. increments with 9 3/4-in. (plus or minus 1/4-in.) of 5/32-in. diameter electrodes, using the following electrical conditions and speed: Amperes—130; arc volts—27; speed of arc travel—2.55 ipm; length of time between deposition of increments—45 sec; all joints positioned so that axis and face of weld are horizontal. Recently 145 amp and a speed of 2.85 ipm have been used. This gives the same heat input per inch.

The type and make of electrode are very important in this test and the American Welding Society classification E-6010 has been regarded as a standard and is therefore now recommended.

Three increments of weld are deposited before the part of the joint which is to be cut into specimens is reached. During that time the welder is able to judge his speed and electrode consumption with such accuracy that practically the exact amount of electrode is generally used in making the required



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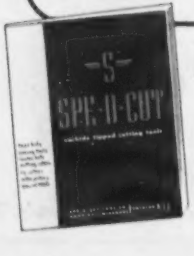

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length of increment. In no case, however, does the error exceed 1/4-in. electrode. This is an error of 2.6 per cent of electrode volume, which represents an average welding size error of about 1.3 per cent. This maximum percentage of error in a 5/16-in. fillet is about 0.004-in., a variation in size far too small to be controlled by any but volumetric means. With the welding conditions controlled so closely, it is believed that any attempt to measure or control the size of weld by gages is unnecessary.

From the standpoint of machined notches, typical prints of the contour of the welds used appear somewhat irregular. From the standpoint of welding, however, the fillets are remarkably smooth and are better than those reproduced in actual service. The irregularities vary from point to point throughout the length of the joint, but in all cases the average size must be 5/16-in. within the tolerance mentioned.

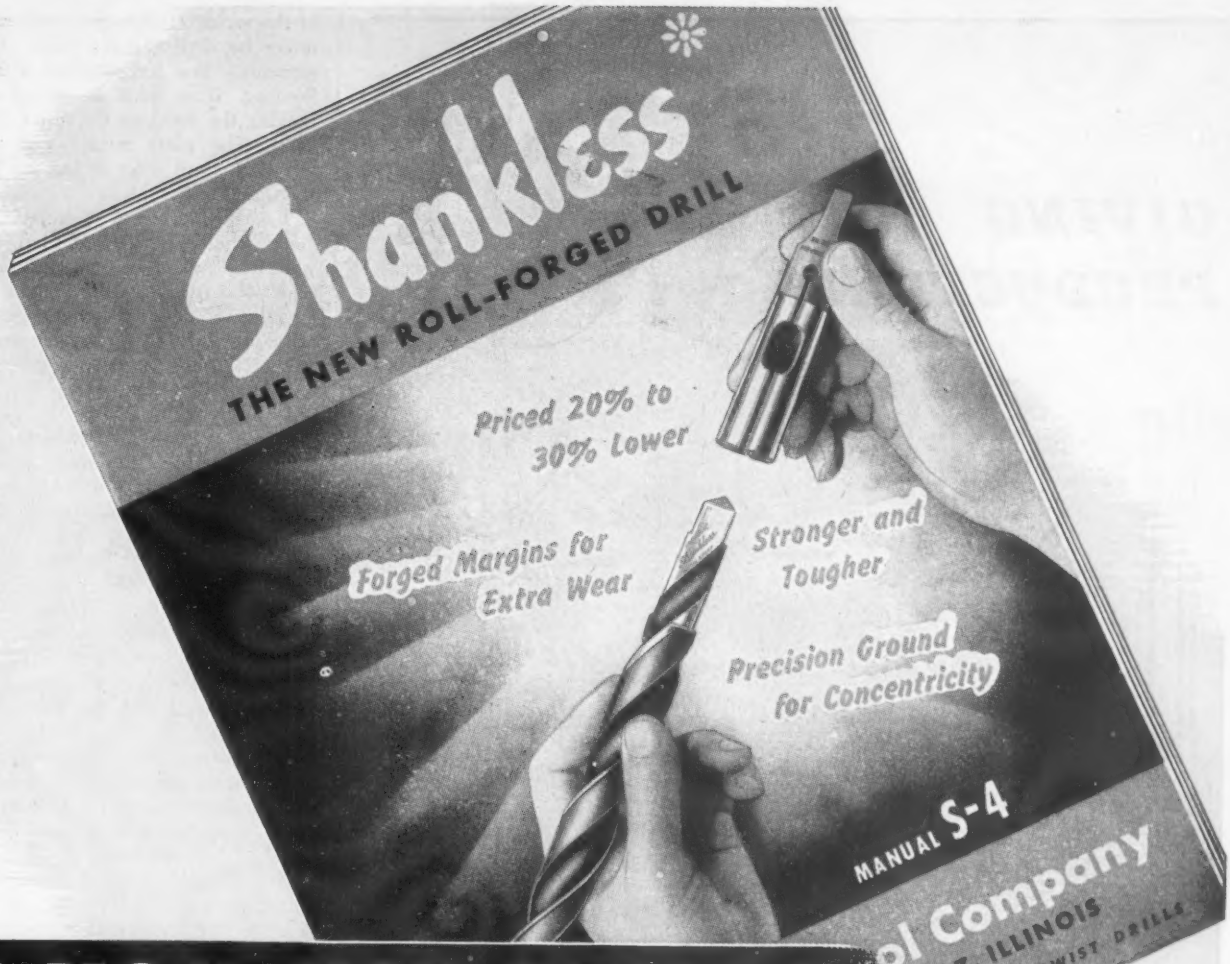
As soon as the welding of an increment is stopped, the heat continues to flow ahead. If the time interval is long enough, without being excessively long, the heat will have progressed forward sufficiently so that there would be considerable preheat in the plate at the time the next increment is deposited. Time interval between deposition of increments is held at 45 sec. Joint is permitted to cool before starting deposition of fillet on other side of stem. Both jig and joint are turned between welds so that welds on both sides of stem are deposited to the same hand and in the same direction. The welding can be done manually by exercising precautions outlined, or by automatic welding machine.

TABLE I
THE EIGHT CONDITIONS FOR TESTING

1. Welded as-rolled, at plus 70° F and tested at plus 70° F.
2. Welded as-rolled, at minus 20° F and tested at plus 70° F.
3. Welded as-rolled, at plus 70° F and tested at minus 20° F.
4. Welded as-rolled, at minus 20° F and tested at minus 20° F.
5. Welded after normalizing, at plus 70° F and tested at plus 70° F.
6. Welded at normalizing, at minus 20° F and tested at plus 70° F.
7. Welded after normalizing, at plus 70° F and tested at minus 20° F.
8. Welded after normalizing, at minus 20° F and tested at minus 20° F.

Welding is done at 70° F and at minus 20° F on plates in the as-rolled condition and in the normalized condition. This provides eight conditions for testing, listed in Table I. In the future the test will be extended to include 10 classifications of longitudinal and transverse specimens subjected to broader range of conditions.

Joints are refrigerated for welding at subzero temperatures by immersing them in a tank of acetone and dry ice at a temperature of about minus 25° F. This subcooling of 5° is to offset any possible temperature rises before the



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of the welding. However, welding should never be done on any plate at such an extremely low temperature without preheating. The joint is recooled before making the weld on the other side of the stem. The plate is not put back into the bath until after it has cooled in air to room temperature.

Fabrication After Welding: The tee-bend specimens are milled from the plates by means of gang milling cutters. The setup for doing this work is shown in Fig. 5. Tension corners of each specimen are broken with a file before testing. Hardness and micrographic specimen always comes from the center of the center increment.

Apparatus and Procedure: Hardness testing is done as shown in Fig. 3. In making a single row of readings, the heat-affected zone is crossed four times at an acute angle. It is known from experience that the maximum hardness thus obtained is about representative of the maximum for the material under the welding condition involved. Hardness surveys were made with a Firth Hardometer and the values obtained are practically equivalent to vickers-brinell readings.

To correct the previously described deficiencies and to retain the use of the fundamentally sound features of the tee-bend test, the authors have developed a method of determining the energy of deformation of welded tee joints. A jig for measuring the energy is shown in Fig. 4. It maintains the geometrical proportions of the Navy jig, but makes possible the drawing of semiautomatic load deflection diagrams by obtaining the deflection abscissas directly and obtaining load ordinates by the operator making points over a scale corresponding to load called out to him by the operator of the setting machine.

The apparatus has a scale calibrated in pounds of load mounted on tee-shaped crosshead extending horizontally across a pad of chart blanks suitably mounted upon the upper frame. Diameters and spans of the rollers and the radius of the mandrel may be varied. The roller supports are removable. The specimen is placed welded side up on the mandrel. The upper part of a jig frame is lowered until stem of the tee-specimen enters the centering slot in the crosshead. This slot is so designed that the upper part of the stem bears against the top of the slot before the supporting rollers contact the specimen. The specimen is both automatically centered and guided. The load always is applied exactly on the center line of the joint because the mandrel has a thickness which will permit its entry into the main jig frame.

At suitable increments of load (generally 200 lb for the 1/2-in. plates), the testing machine operator announces the load borne by the specimen and the jig operator moves a pencil point by hand along the horizontal scale to correspond to the announced load. Testing is stopped at failure of the specimen, or when the desired deflection has been reached. The points, when connected by

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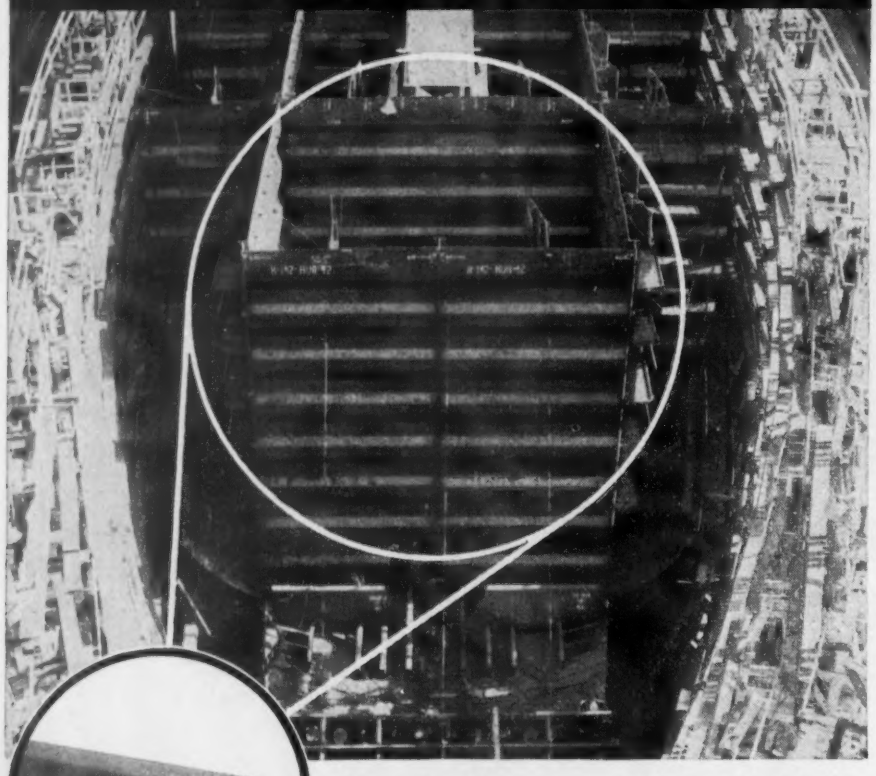

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a continuous curve, form a load-deflection or energy diagram. The area under this curve is measured with a planimeter and is the absorbed energy. The crosshead is moved at a speed of about 3 ipm. It is our original experimental jig and is very crude.

A deflection limit of 2.89 in. originally was established by the Navy Department. This corresponds to an angle of 129°. The Navy subsequently has used 120° as its limit but the authors have retained the 129°.

If no failure of any kind occurs, an energy diagram may be obtained. This diagram (Fig. 5) is typical of the performance of the best welding materials. The load falls off in an approximate straight-line relationship after the peak has been passed. If a partial tear occurs, the load-deflection curve will depart from the straight line. The total angle of bend at the point of departure may be obtained from an angle-deflection curve. A complete tearing failure results in the load falling off rapidly. If a sudden fracture takes place, the load immediately falls to zero. The energy absorbed then depends on the deflection and load which had obtained up to the time of failure. The fracture may take place after the peak load has been passed, or it may occur before reaching the peak load which the material should have been capable of sustaining had it had sufficient ductility after welding.

TABLE II
COMPOSITION, HARDNESS, AND TENSILE STRENGTH OF TYPICAL CARBON STRUCTURAL STEEL

Carbon	0.20%
Manganese	0.41%
Phosphorus	0.008%
Sulphur	0.032%
Silicon	0.07%
Yield point	30,820 psi
Ultimate tensile strength	60,880 psi
Elongation in 8 in.	31.5%
Vickers hardness	125

Tee-bend energy—13,200 in. per lb (welded and tested at plus 70 °F.)

Inspection of an energy diagram made to a known scale enables the following to be ascertained:

(a) Magnitude of load at any deflection.

(b) Deflection at any load.

(c) Point (load and deflection) at which nonelastic deflection begins.

(d) Point at which maximum load occurs.

(e) Point of occurrence of start of marked failure, if any.

(f) Character of failure, that is, whether gradual, abrupt or none.

Carbon structural steel has been welded successfully for many years, in many forms and sizes, and under many conditions. The authors came to regard the energy absorption of this steel as a suitable reference for purposes of comparison with welded specimens of other steels in respect to energy absorption.

The composition of a typical example of this grade of steel and its hardness and tensile properties in 1/2-in. plate

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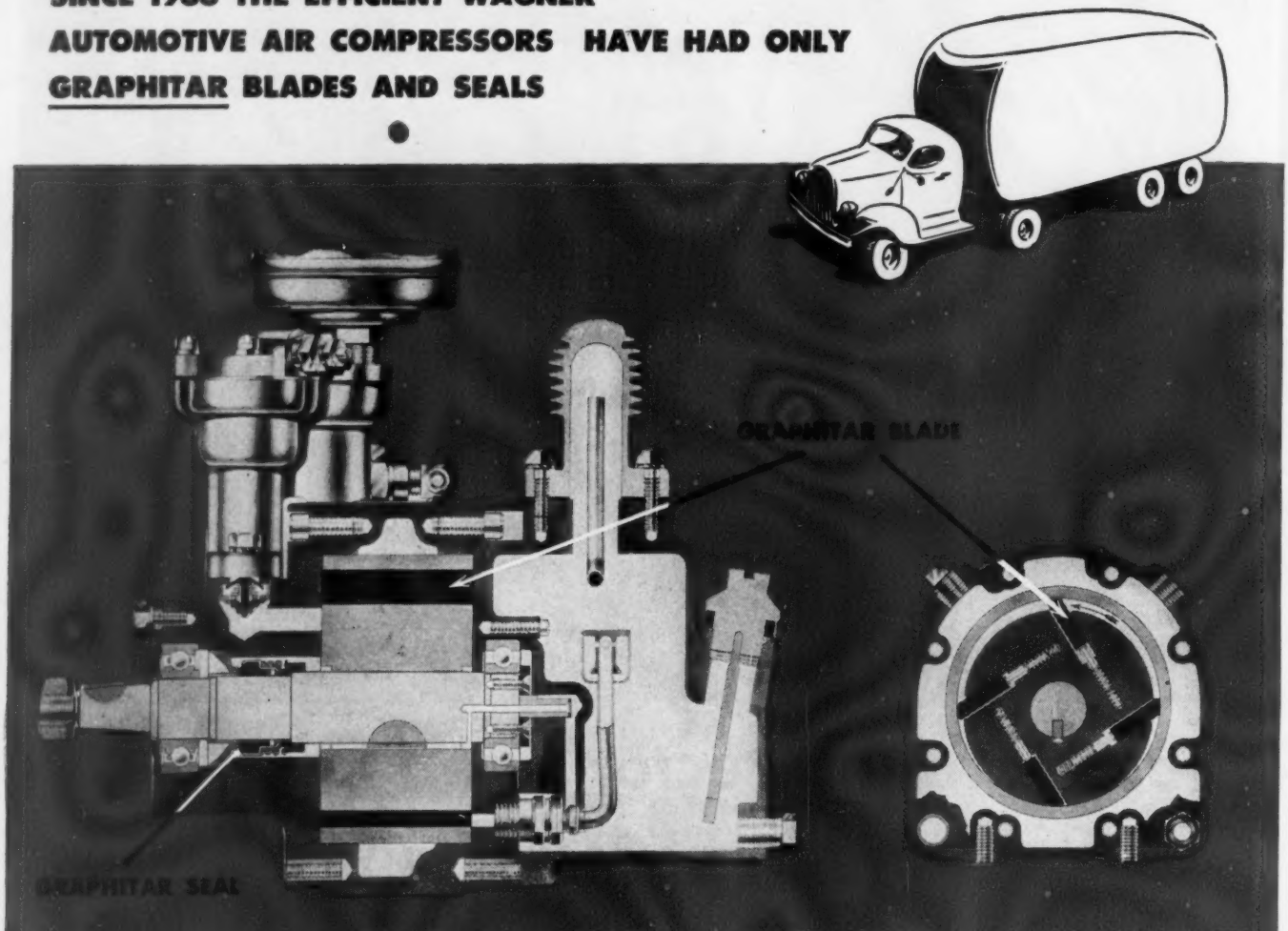

One of the most outstanding developments in its field is this rotary compressor which supplies the compressed air for the Wagner automotive air brake systems. In the compressor, air is compressed by blades which must seal very closely, and a positively leak-proof seal must be made where the driving shaft extends from the unit. It is significant that GRAPHITAR has been used for both the blades and the seal for seven years.

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Because it will not melt or fuse at any temperature, it is ideal for use as carrying pads in the glass-making industry, and as bearings and seals in bakery ovens, kiln cars, and steam dryers. It makes serviceable, durable seals and pistons and rings for practically all pump and meter installations. Graphitar may solve a mechanical or engineering problem troubling you. Write for complete particulars.

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are shown in Table II. This material has a tensile strength very close to the usual 60,000 psi minimum and a yield point of about half of its ultimate strength and in the tee-bend test it bends to 129° without failure of any kind. The authors have found it convenient to consider its tee-bend energy of 13,200 in. per lb as an arbitrary standard. The energy of this same steel when welded or tested at different temperatures and also the energy of other steels can be referred to the above standard, and the ratios of the energies expressed in percentages. The tee-bend data thus can be converted to a simple percentage system from which all opinion has been removed.

Generally speaking, the energy is influenced by variations in welding processes and techniques, to variations in strength and cleanliness of the material, to composition and to preheat and postheat treatment of the material or of the joints. Without the use of the energy diagrams to obtain a quantitative summation of the influence of these factors upon the strength and plasticity of the specimen, the full benefit of the tee-bend test was not secured.

The Carnegie-Illinois Steel Corp. has an assignment of certain patents pending on the tee-bend-energy test and on the apparatus, but the company will be pleased to permit free use of the test and the apparatus. The test is not considered to have any application outside of research.

Mr. Bibber and Mr. Heuschkel presented a more detailed report on the tee-bend test before the Weldability Committee of the Welding Research Council. Additional data on this subject also may be obtained by referring to the December, 1944 issue of *The Welding Journal* and the *Welding Journal* Research Supplement for March, 1942.

Fires Controlled by Water and Foam

Fires may be divided into three classes: Combustible materials; inflammable liquids; and electrical fires, according to the 1216th Engineer Fire Fighting Platoon in Belgium. Those originating through V-1 or V-2 bombing activities usually combined all three. Combustible materials such as rags, wood, paper, etc., are controlled with water. Inflammable liquids such as gasoline, oil, paints and varnishes, etc., are blanketed by a foam, formed by the action of bicarbonate of soda, water, aluminum sulphate, and licorice root. This substance expands to eight times its enclosed size upon striking air, cutting off the oxygen supply of a large surface. Electrical fires occurring in equipment, motors, wirings, etc., require the same principle of oxygen depletion, but a different method. Carbon-tetrachloride directed into the flame forms a heavy cyanic gas, smothering its objective. This, unlike water or foam, causes no damage to equipment and is a nonconductor of electricity up to approximately 22,500 v.

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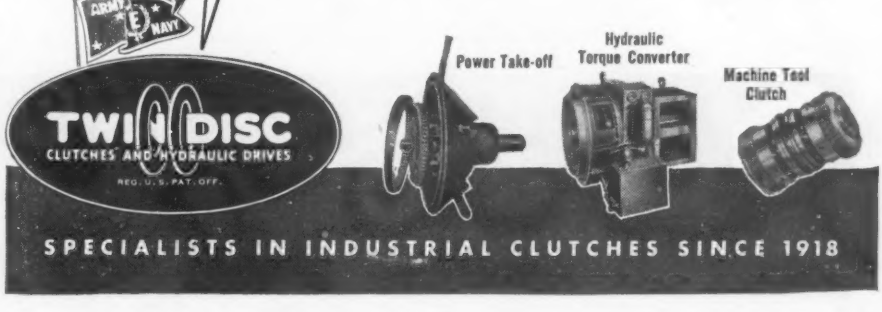

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(*Continued from Page* 136)

ing mills or at the reels, there is a snap shear located in front of No. 14 stand where the bar can be cut off by controls which are located at the reels, finishing mills, and No. 14 stand; or by the speed operator in the pulpit, or at the flying shear—the alarm being by both red light and siren. This 5-position control is unique.

The bigger the section at which the mill can start taking scrap in case of a cobble, the less trouble. This rod mill setup is arranged to take scrap from three places. The total length of the billet at the rod reels is about 5100 ft in lowest diameters, there being 4 to 5 ft of billet still left near the furnace when the rod hits the reels.

The main motor and mill speeds servicing this 21-stand setup is detailed in the accompanying table.

The nine motors are alphabetically labeled to indicate the stands they service. No. 13 and 14 stands are direct driven.

Reels Are Water Cooled

The laying reel arrangement of the rod mill had two lines of three reels each, the feed alternating to these. The head of each is driven, the work being laid onto the reels. These reels are 34 in. inside, 46 in. outside, and hold 600 lb of rod. They are water cooled, the heads having a baffle arrangement.

The billet leaves the furnace at 2250 to 2350° F and arrives at the finishing mill at 1750° F. Here, there is a pickup of temperature of about 50° caused by working the metal. The rod leaves the finishing mill, therefore, at about 1800° F and is water cooled in the finishing scalebreaker before it enters the reel pipes at about 1400° F. Control of finishing temperature is important from the standpoints of scale produced and acid consumption involved in the subsequent pickling operations.

A reel operator control stand is over the reeling floor and discharge of the reels is automatic by pushbutton. This operator throws a lever which depresses the reel pin, permitting it to sink away from the coil of rod which then is pushed onto conveyor, synchronized to proper position and pushed by shark fin. Then the coil starts its synchronized trip up the incline to final inspection and disposal. The entire flow of rod from furnace to coils at shipping platform is scheduled on synchronized basis which involves carefully controlled rolling speeds and conveyor movements.

The coil travels up the inclined apron conveyor, there being one for each set of three laying reels. This is motor driven and has a sectional flat iron floor of continuous nature, moving about 250 ft. It is of the shark fin type and takes about 15 min to deliver a coil from lay to hook.

The hook conveyor onto which the coil then comes, picks up the coil from the apron conveyor and the hooks are

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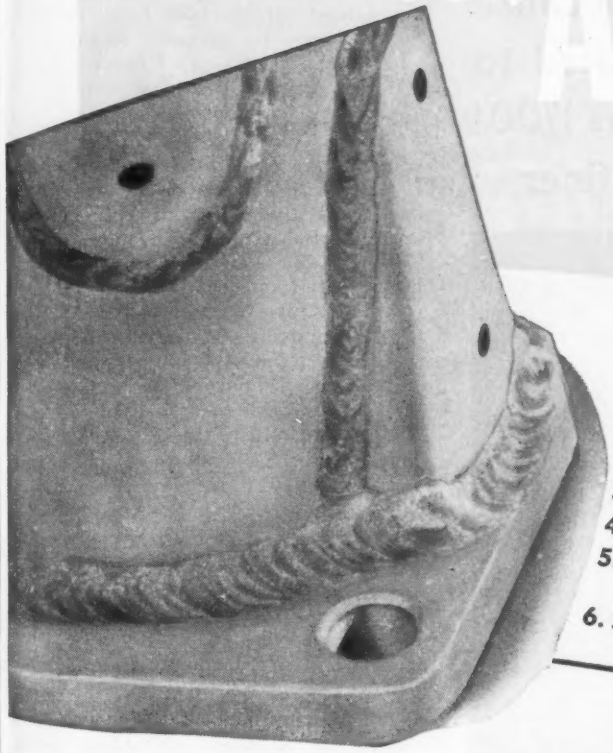

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Belt keeps cutting clean and fast long after ordinary aluminum oxide belts, costing as much or more, give up the ghost. It's because SILVER STREAK is insulated — insulated to stay cool at grinding heats as high as 1700! Try SILVER STREAK Grits — 40, finer.

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SOUTH BRAINTREE 85, MASSACHUSETTS

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then propelled by link chain, each hook carrying a coil. This conveyor avoids the hazard of piling up the hot coils. The hooking comes over, the conveyor making it pass through a slot as it moves up a slight incline which trips each hook up so that by the time the coil reaches the vertical-shaped apron point, causing the section to drop, it is positioned automatically to receive the coil which is then left suspended on the hook as the apron section retreats.

There are 1200 ft of this chain conveyor carrying the hooked coils in six rows of travel to the unloader station at the shipping dock. This arrangement provides the travel necessary to thorough cooling and inspection yet requires little space.

All coils are inspected for gage and surface defects. A part of them are bundled for shipment while on the hook conveyor, being fastened with from one to four tie wires for shipping. The coils are removed from the hooks by an air-operated hoist and placed on cradles which are picked up by a motor-driven hoist. Using a long pin thrust, this then transports them to weighing scale on the unloading platform. Thereafter the coils are loaded on specially built double-deck flat cars for shipment to the wire mill which is at another location on the 400-acre Pittsburg Works property.

Not All Coils Laid

Not all of the coils are laid. The 3/8 to 1 in. rods and larger are made coiled on two large single strand reels. These are large drums into which the rods coil, being fed into them by pipe, the reels having revolving pins. The pouring reel speed is also synchronized with the finishing mills and the coils are discharged to the aproned conveyor in the same synchronization. The co-ordination of ingots from open hearth to rolling mill to rod mill to wire mill is carefully scheduled. This greatly facilitates inventory and yield control.

The motor room is 200 x 50 ft, and is serviced by a 40-ton crane and houses seven main drive motors. One 7200 hp motor supplies power for two 2500 kw generators. Direct current is necessary for speed control of the rod mills, the incoming power being alternating current.

The finishing stands of the rod mill are completely enclosed with fine mesh screen. All high-speed spindles have heavy guards. Safety screens are provided at all spots where cobbles could occur. Safety engineers are assigned to the rod mill as a division of the industrial relations department.

A completely equipped shop is maintained to turn and dress all rolls and make all guides, the bronze castings for the latter being poured in the works foundry.

The water system has a capacity of 7200 gpm. Water is obtained from the Central Valley aqueduct adjacent to the plant. This is used principally for cooling rolls. It circulates to the scale pit to drop heavy scale, and to the floc-

Horse sense about Horsepower

Common, ordinary horse sense tells us that worn cylinders mean lost horsepower . . . and horsepower costs money.

To cut down this waste and keep engines up to top efficiency, we need something that will stand up to the beating that cylinder walls get. At least, that's what Hendrik van der Horst figured . . . and several years ago he discovered a cylinder wall surface that multiplies cylinder life 4 to 20 times.

Van der Horst discovered a method of bonding a thick layer of chromium to the cast iron of the cylinder bore and then giving it a "porosity treatment". Everybody knows that chromium resists corrosion and that it is almost as hard as diamonds. But the unusual feature of Van der Horst's PORUS-KROME is the porous nature of its surface.

PORUS-KROME has thousands of tiny pores or channels in its surface . . . so tiny you can't see them with the naked eye. They act as reservoirs, holding lubricating oil and feeding it back to the surface as needed. Not only does PORUS-KROME make cylinder walls last longer, but it also multiplies the life of the conventional rings 3 to 5 times.

These are the reasons so many Army and Navy engines have PORUS-KROME in their cylinders. And it's just good horse sense to plan to have it in your engines, too. Write for booklet telling all about PORUS-KROME.

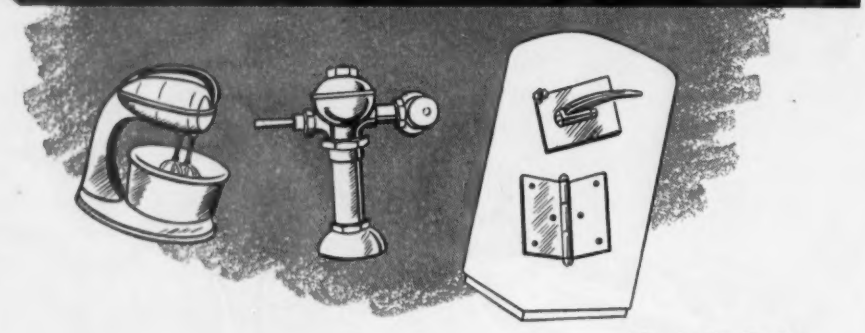
Van der Horst Corporation of America, Olean, New York. *Plants in Olean, New York and Cleveland, Ohio.*

PORUS - KROME

Good for the Life of your Engines

VAN DER HORST

BETTER VALUES IN HOUSEHOLD APPLIANCES THROUGH DIE-CASTING



No. 1 of a Series
Die-Casting and the American Way of Life

From the time you get under your morning shower or open the faucet in the wash basin till you turn off the radio and lights and hop into bed at night you are in almost constant contact with articles which have been made better and less expensive through die-casting.

In the field of household appliances die-casting plays a stellar role. Paradoxical as it may seem, housings, gears, intricate moving parts, can be made more accurately in less time and at less cost when die-cast.

We invite your consideration and consultation on redesigning and engineering your products postwar with the possible more extensive use of die-castings of "Quality with Economy."

ADVANCE PRESSURE CASTINGS, INC.

ENGINEERS, DESIGNERS AND MANUFACTURERS OF DIE-CASTINGS OF "QUALITY WITH ECONOMY"

42 NORTH 15th STREET, BROOKLYN 22, NEW YORK

culator where the fine scale settles away. Water then is pumped to the cooling tower that drops its temperature to about 75° F. The range of temperature drop possible in this tower is 25°. The system requires about 200 gal make-up per minute. The flocculator is 44 ft in diameter at its inner cone, 90 ft OD, has 12 ft sides and is 19 ft deep with a 736,000 gal capacity.

The oiling system of the rod mill is from a central oil cellar of 12,000 gal capacity which services all of the unit's gears and bearings with full automatic filter temperature and pressure control.

Automatic Charger Prevents Gun Jamming

An automatic gun charger that prevents failure of aerial machine guns because of defective rounds of ammunition has been developed by General Electric Co., Schenectady, N. Y. Device initially cocks the airplane's guns, will recognize an ammunition failure, help dispose of a defective round, and insert and fire a new one. If a gun repeatedly fails for approximately eight successive rounds, it will stop further operation of that gun.

Machine is essential whenever aerial machine guns are located so that they are not readily accessible to the man firing them. Chargers perform electrically the same job a gunner in a directly controlled turret performs by first thinking out the trouble and then correcting it by hand.

Gun charger consists of three principal units: Charging, firing and timing. Firing unit fires the gun normally; timing unit determines when to charge the gun, in case a defective round occurs; and charging unit clears ammunition malfunctions.

Air that is under the high pressure of 1000 psi is used to operate the charger. To make available a constant supply of air without using air bottles, which require frequent refilling, engineers developed a small air compressor. This is mounted on the turret where it maintains a supply of high pressure air at all times, with no need for refilling pressure tank from an outside source. Pressure produced by this compressor is said to be higher than that reached by any similar device previously used on planes.

Fifty-caliber machine guns on airplanes will operate under almost any atmospheric conditions. Charger also is designed to function under the same conditions. Its continuous operation is said to be permissible at temperatures ranging from 65° F below zero to 160° F above zero as well as under extremes in humidity and at any altitude. As charger is primarily a safety device to insure continuous operation of the guns, it is so designed that its failure will not occur for same reasons that might otherwise cause gun failure.

SYNTRON

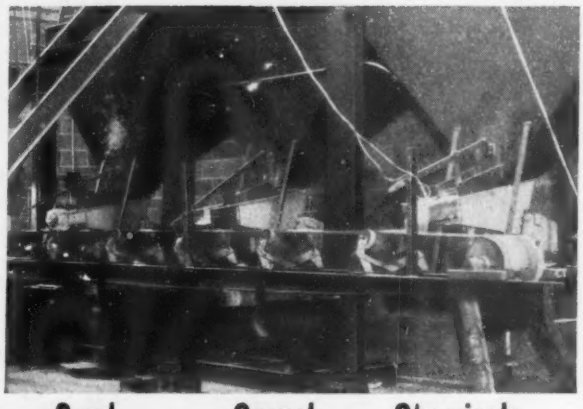
"Vibra-Flow"

VIBRATORY FEEDERS

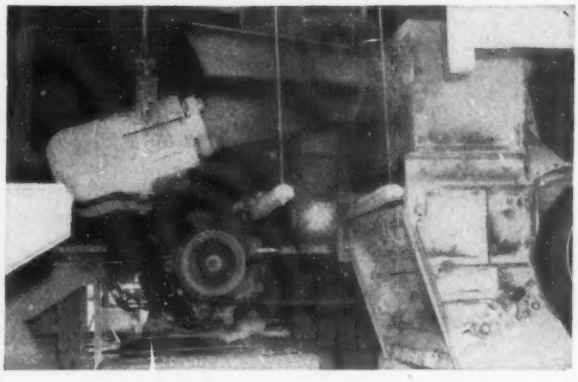
SPEED UP

YOUR MATERIAL HANDLING

Ore Sinter Rock



Sand Gravel Chemicals



Instant control of rate of feed by simple rheostat regulation.

Available in capacities of from Ounces to 500 tons per hour—and in trough styles, such as:

FLAT PAN • TUBULAR • SPREADING SCREENING and others.

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BRASS

BOLTS · NUTS STUDS

Brass and bronze, all types—every non-ferrous metal – available in every standard dimension or to your specifications.

Better Bolts of Iron, Steel, Brass and Other Metals Since 1882.

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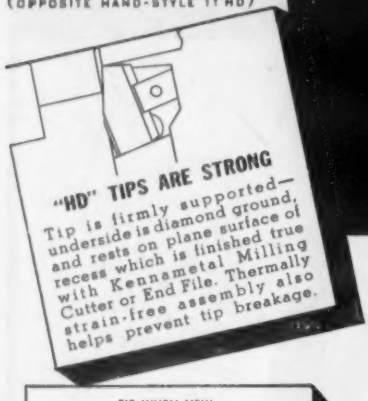
THE PLACE TO SOLVE YOUR BOLT PROBLEMS

Introducing—

KENNAMETAL "HD" TOOLS

WITH CLAMPED-IN, ADVANCEABLE KENNAMETAL TIPS

STYLE 12 HD
(OPPOSITE HAND-STYLE 11 HD)



"HD" TIPS ARE STRONG

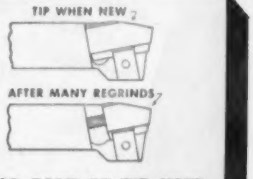
Tip is firmly supported—underside is diamond ground, and rests on plane surface of recess which is finished true with Kennametal Milling Cutter or End File. Thermally strain-free assembly also helps prevent tip breakage.

for HEAVY-DUTY Machining on Steel and Cast Iron

Kennametal HD Clamped-On Tools make practicable high rate carbide machining on heavy steel forgings, castings, and bar stock, and cast iron, because the strength of the special HD tips and the perfected design of the tool enable deep cuts and heavy feeds to be taken at intermediate speeds, with amazing tool life.

HD Tools are now available in two styles—11HD and 12HD—for heavy duty turning and boring operations, with special HD tips in Grade KM for general steel cutting, Grade K2S for machining very rough or scaly steel castings, and Grade K6 for cutting cast iron. Larger sizes, i.e., with shanks 1" to 2" wide, are now being produced.

Catalog information, and prices, will be sent immediately upon request.



MAJOR PART OF TIP USED

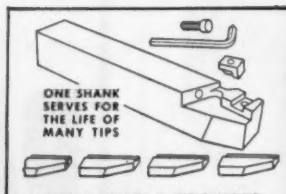
When dull, tip can be advanced, and resharpened time and again, until the major part of it has been used.

ECONOMICAL REGRINDING

Only the tip is reground—no shank steel is removed. Operation is fast—clogging of diamond wheel grinder with steel is prevented.

STREAMLINED DESIGN

Smooth, unimpeded chip flow assured by improved clamping arrangement, correctly positioned. HD design employs pressures set up in cutting as factors to help hold tip in place.



FEWER TOOLS REQUIRED

Many tips can be used during the life of a shank, and tip of suitable Kennametal composition can be used for each job.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL *Inc.*, LATROBE, PA.

Book Notes

Postwar Government Cost Large Factor in Business

Postwar Fiscal Requirements, by Lewis H. Kimmel; cloth, 166 pages, 6 x 9 inches; published by the Brookings Institution, Washington, for $2.

Intelligent planning for the future is not possible without an understanding of the overall fiscal requirements being built up, federal, state and local. Tax burdens on business and individuals will be determined by the volume of public expenditures. Whether we will be able to attain financial stability will depend in large degree on the level of government cost.

The objective of this study is to estimate as accurately as possible the magnitude of federal, state and local expenditures after the fiscal year 1949. The estimates are presented by functions for each level of government and all governments combined, in four simple summary tables.

In developing the estimates, major emphasis has been placed on the influence of government policies on the volume of expenditures. The effects of population growth, increased national income and changing level of prices have been carefully weighed.

Stress Analysis Studies

Experimental Stress Analysis, cloth, 169 pages, 8½ x 11 inches, published by the Society for Experimental Stress Analysis, Central Square Station, Box 168, Cambridge 39, Mass., for $5.

A presentation of the papers read before the society's 1944 fall meeting in Cleveland, and the symposium on crankshaft stresses, this volume contains a membership list of the society and its officers and corporation members.

The 15 papers and discussions cover a wide range of subjects, including processes, instruments for testing, metallurgy and other topics. The papers are illustrated by drawings and halftones to bring out the points of importance. This is No. 2 of Vol. II of the procedings of the society, prior issues covering earlier meetings.

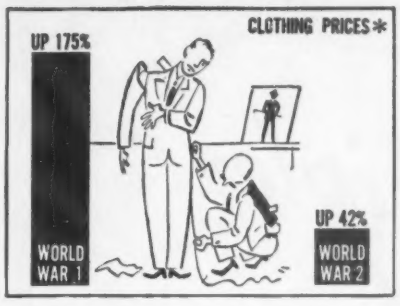
Simplified Designing Of Structural Steel

Simplified Design of Structural Steel, by Harry Parker; fabrikoid, 226 pages, 5 x 7¾ inches; published by John Wiley & Sons Inc., New York, for $2.75.

This is the fourth of a series dealing with design of structural members used in building construction. The present volume treats of the design of the most common structural steel members met in steel construction. The author endeavors to show how application of basic principles in mechanics simplifies problems.

With the idea that use of tables and formulas blindly is dangerous the author

"Ceilings" are saving you money



*64 months after war started

It's a far longer and more expensive war than the last one—but this time the cost of living hasn't been allowed to get out of hand. If you're ever tempted to grumble at price-and-wage controls, look at these charts—and DON'T. They're one reason to bless ceiling prices...and to check 'em whenever you shop. (They're posted for your protection!)

Rationing gives all a fair share

The Millionbucks get no more points than the poorest folks in town. Necessities are rationed to see that each gets his share. And rationing also keeps prices down: without it the fellow with the biggest wad of dough would have a terrific edge. Share and play square ... pay points for everything you buy. (And shun black markets like the enemy they are!)

—and the money you DON'T SPEND helps hold living costs down

The plain bread-and-butter fact is this: there's about $1.50 in people's pockets for every dollar's worth of goods in the stores.

Splurge—buy anything you don't actually need—and you put the heat on everything to rise all along the line.

Save—deny yourself something you want but can get along without—and you help yourself a little today and a lot tomorrow.

Squeeze that budget. Squeeze a little more money into your savings account. Squeeze a little more into insurance. Squeeze yourself into buying another War Bond today ... and every month from now on in.

Wise enough to harness your money for your own safety?

ONLY YOU CAN DO IT.

A United States War Message prepared by the War Advertising Council, approved by the Office of War Information; and contributed by this magazine in cooperation with the Magazine Publishers of America.

Take Triplex for TOUGHNESS
• No matter how good the materials may be in building trucks, automobiles, refrigerators, ships or machinery, they fail sooner or later if the parts are not assembled with tough dependable fasteners. That's why TRIPLEX has been getting increased preference every year for a quarter of a century.
Cap Screws made in flat, hex, filister and button heads, with free-running threads.
THE TRIPLEX SCREW COMPANY
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TRIPLEX THREADED FASTENERS
CAP AND SET SCREWS • BOLTS, NUTS AND RIVETS

aims to give a clear understanding of the underlying principles on which the tables and formulas are based. Derivations of the most commonly used formulas are given to aid the reader to comprehend why certain formulas are appropriate in solution of specific problems.

The reader is assumed to be unfamiliar with the subject and the discussion advances by easy stages. Most of the fundamental principles of mechanics are reviewed and in general the only preparation needed is knowledge of arithmetic and high school algebra. The text is suited to classroom work or home study. Much of the book is devoted to solutions of illustrative examples, followed by problems to be solved by the student.

How to Start and Operate A Metalworking Shop

Establishing and Operating a Metal Working Shop, paper, 202 pages, 6 x 9 inches; published by United States Department of Commerce for 35 cents, from superintendent of documents, U. S. Government Printing office, Washington 25.

This is No. 16 of an industrial series and originally was prepared as an educational manual for the War Department. It is the first of a series of small business manuals for guidance of those planning to establish enterprises of their own.

The series is designed to furnish sound and practical information on establishing and operating various types of enterprises, covering mechanical, retail and service trades. Assuming that the reader is an experienced, skilled worker, the mechanical side of the business is not covered except as it pertains to the management.

All factors connected with establishment of a metalworking shop are discussed, choice of location, capital investment, organization of business, type of building and layout, unusual sources of business, credits and collections, record keeping etc. Pitfalls to be avoided are clearly indicated. A check list of things to be remembered also is included.

New German-English Dictionary of Metallurgy

German-English Dictionary of Metallurgy, by T. E. R. Singer; cloth; 297 pages, 5 x 7 inches; published by McGraw-Hill Book Co. Inc., 330 West Forty-second street, New York 18, for $4.

In addition to metallurgical terms this includes related material on ores, mining and minerals, crystallography, welding metalworking, tools, metal products and metal chemistry.

The volume is intended for technical people using material in metallurgy and related fields. Where two or more German words have the same meaning both are included. In addition, the recent tendency in Germany to eliminate technical words of foreign origin has been noted with entries followed by indication "present day German for," the more familiar German word and a definition in English. Many obsolete terms also are included, since they are met in older literature and old patents.

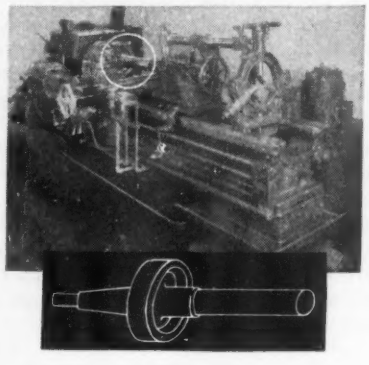
New Hard-Facing Metal Resistant to Abrasion

A new nonferrous hard-facing metal has been developed for acetylene torch application to steel by Fansteel Metallurgical Corp., North Chicago, Ill. The metal, named Fanweld, is said to be resistant to abrasion, heat, impact, and erosion. It contains tantalum-columbium carbide which imparts a peculiar self-lubricating action to minimize destructive effects of friction even at elevated temperatures. It is suited for hot-work punches, dies and tools.

Properly applied, Fanweld "wets" steel surfaces without use of flux; it flows on smoothly and evenly. Surfaces as thin as 0.010-in. can be treated with a fusion layer as thin as 0.0005-in. No hardening or heat treating operations are necessary. The product is prepared in 3/16 and ¼-in. diameter rods in 14-in. lengths.

Template Attachment Reduces Machining Time

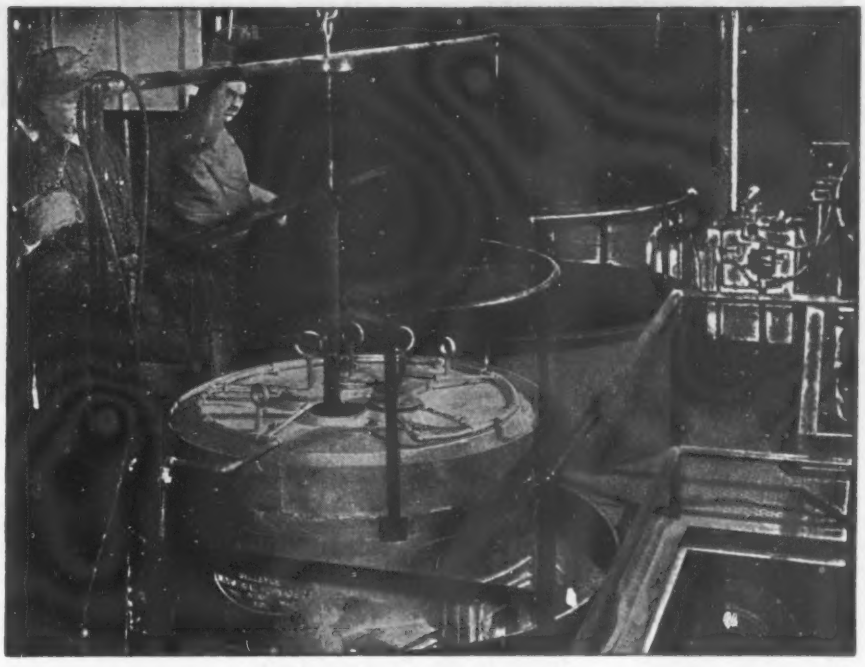
Facing of the curved recess in a 14-in. diameter aircraft engine drive shaft on a lathe is being accomplished in one-ninth the time formerly required, according to Turchan Follower Machine Co., 8259 Livernois, Detroit 4. Method of duplicating the curved recess by means of a simple template makes possible the



use of a single turning tool, as shown in the accompanying illustration. Due to faster feed rate and elimination of tool changes, the job is completed in 10 min. Using template for a guide, Hydraulic Follower attachment controls the tool so that automatic sizing of recess is assured.

Simplified Practice for Cast Fittings Recommended

A proposed simplified practice recommendation for cast brass solder-joint fittings has been submitted to producers, distributors, and users for acceptance and comment, according to the Division of Simplified Practice, National Bureau of Standards, Washington 25, D. C. Proposal contemplates establishment of a voluntary simplified list of cast brass



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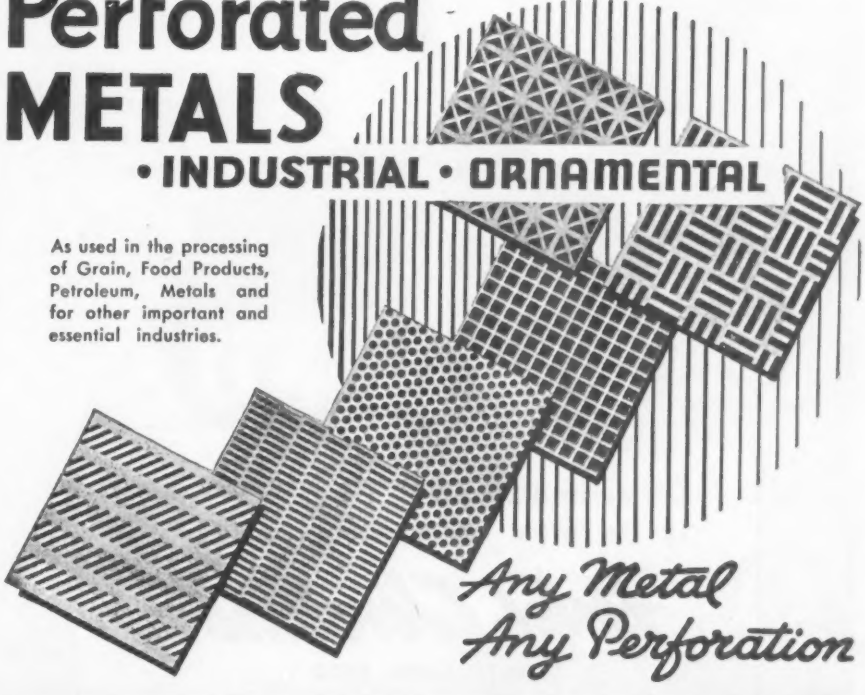
As used in the processing of Grain, Food Products, Petroleum, Metals and for other important and essential industries.

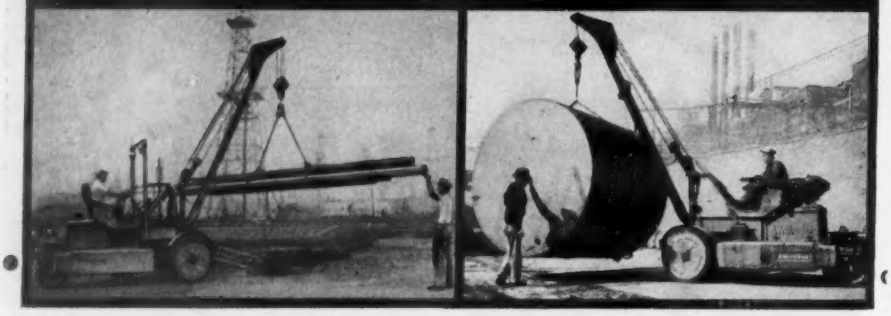


Any Metal Any Perforation

The Harrington & King PERFORATING Co.

5634 Fillmore St., Chicago 44, Ill. 114 Liberty St., New York 6, N. Y.

KRANE KAR HANDLES MATERIALS *Faster*



KRANE KAR handles the load *ONCE* . . . picks it up, transports, and positions it. Loads, unloads, and spots freight cars; carries punch press dies, heavy rolls . . . anything from one to 10 tons, at the sides as well as the front. Moves pipe, heavy valves, fittings, overhead line shafting, motors, controllers, transformers, and heavy machinery, in plant alterations and repairs. Has short turning radius, automatic load and boom braking, is fast, flexible, safe, easy to operate. KRANE KAR saves time and labor; reduces handling costs. Write for Catalog No. 58.

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Agents in the Principal Cities

THE ORIGINAL SWING BOOM MOBILE CRANE
WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER

2½, 5, AND 10 TON CAPACITIES

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solder-joint fittings representing the best thought of the industry, its distributors, and customers as to what constitutes desirable practice for the present and for postwar days. Sketches illustrate 37 types of fittings, various sizes of which are included in the proposed list.

Standards Established for Porcelain-Enameled Utensils

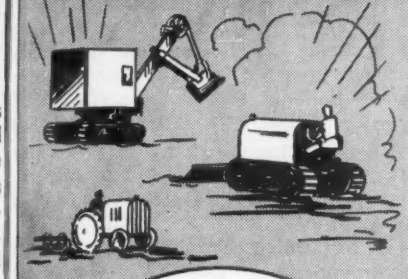
Porcelain - Enameled Steel Utensils (Second Edition), Commercial Standard DS100-44, describes certain tests to be conducted on standard 2 qt test pans to compare quality of enamel, irrespective of shape, thickness, or size of utensil. On recommendation of Enameled Utensil Manufacturers Council, purchasers are encouraged by National Bureau of Standards, U. S. Department of Commerce, Washington 25, D. C., to test any size or shape of utensil to extent indicated by the following:

1. For boiling acid resistance, test any utensil (three specimens) having a bottom diameter large enough to permit blanking out of a test plate as specified in paragraph 16a (10).
2. For thermal shock, test any utensil (five specimens) that can be filled with water to a depth of 1 in.
3. For impact resistance, test any utensil (five specimens) having a diameter of 4½ in. or larger when measured in a plant ⅜-in. above bottom of pan. All multiple-coated ware of this diameter and less than that of the standard pudding pan when measured in a plane ⅜-in. above the bottom (4½ to 6⅜ in. diam) should have an impact resistance of at least 9 in. when tested, as specified in paragraph 18. All single-coated ware in this group (4½ to 6⅜ in. diam) should have an impact resistance of at least 6 in. Seamed ware in which seam forms bottom outside radius is not tested for impact resistance, and ware which normally rests on a foot or a reverse panel shall be tested for impact on the true radius of ware and not on the foot.

Care of Workers' Feet Subject of New Manual

A manual entitled "Let's Use Our Heads and Save Our Feet" is a comprehensive, 64-page, illustrated digest of facts and practical suggestions designed to aid safety directors in protecting workers' feet. It is part of an extensive campaign conducted by Hy-Test Division, International Shoe Co., St. Louis, to make management more fully aware of the services of safety directors. Among subjects covered are: Working methods for securing co-operation of management and workers; types of foot hazards and shoes that guard against them; internal shoe store location, management, selecting balanced stock, proper fitting; answering objections to wearing safety shoes; and approved methods for the care of feet, care of shoes.

HARD FACING?



THESE
AGILE
ELECTRODES
WILL SOLVE 90% OF YOUR PROBLEMS

DARK GREEN: For economical repair of wearing parts on machinery, plows, excavator buckets, shovel teeth, valves and dies, as well as any other machine part damaged by severe wear and impact.
Brinell Hardness 400-600.

PINK: For hard-surfacing of steel parts in process manufacturing as well as for refacing of worn carbon steel parts, mainly worn or battered rail-ends, tractor shoes and car-wheels.
Brinell Hardness 290-400.

RED: A medium hard and abrasion resistant hard-surfacing material where machineability after welding is required. Usual applications are the rebuilding of gears, knuckles, brakeshoes, clutches, etc.
Brinell Hardness 200-250.

VIOLET: A self-hardening, 12-14% manganese steel weld deposit for the building up of surfaces exposed to extreme impact and abrasion, such as railway frogs, crusher jaws and rolls, pulverizer hammers, etc.
Brinell Hardness 200-490.

AMERICAN AGILE CORPORATION
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Surface Plate—For reverse spotting, granite surface plates are nonabrasive, nonmagnetic, durable, temperature-resistant, nonwarping, rustproof and corrosionproof. Herman Stone Co., 324 Harries building, Dayton 2, O. ST381

—o—

Protective Coating—Dry spray booths and surrounding areas may be kept clean by coating surfaces likely to be spattered by spray with compound No. 229. Greaseless and fireproof, it is applied with spray gun, brush, or trowel. Coating may be removed with adhering paint, trowel or scraper. Fidelity Chemical Products Corp., 430 Riverside avenue, Newark 4, N. J. ST376

—o—

Cement—For bonding brick or tile in acid-proof masonry construction, Duracite is a resinous, acid-and-alkali-proof cement. Available in liquid and powder form and is mixed on the job. U. S. Stoneware Co., Akron, O. ST349

—o—

Protective Shield—Provides safety and simplified visor replacement. Features snug fit, comfort, and head, neck and chest protection. Chicago Eye Shield Co., 2300 Warren boulevard, Chicago 12. ST344

—o—

Masking Tape—Koroseal tape MX can be used for practically all kinds of plating solutions, including chromic, alkali and acid dips. Any item which can be covered with regular friction tape can be masked by this product. B. F. Goodrich Co., Akron, O. ST382

—o—

Plastic Eye—Can be dropped without breaking, will not corrode and may be reshaped to provide an exact fit. Eye consists of three parts—sclera, recess for iris, and iris button—fused together. American Optical Co., Southbridge, Mass. ST356

—o—

Dehumidifier—Designed to dry the air in warehouses, tool rooms, stock rooms, vaults, etc., Water-Sorber prevents dampness, mold and mildew. One unit will service from 800 to 1000 cu ft. General Air Conditioning Co., Oakley, Cincinnati, O. ST345

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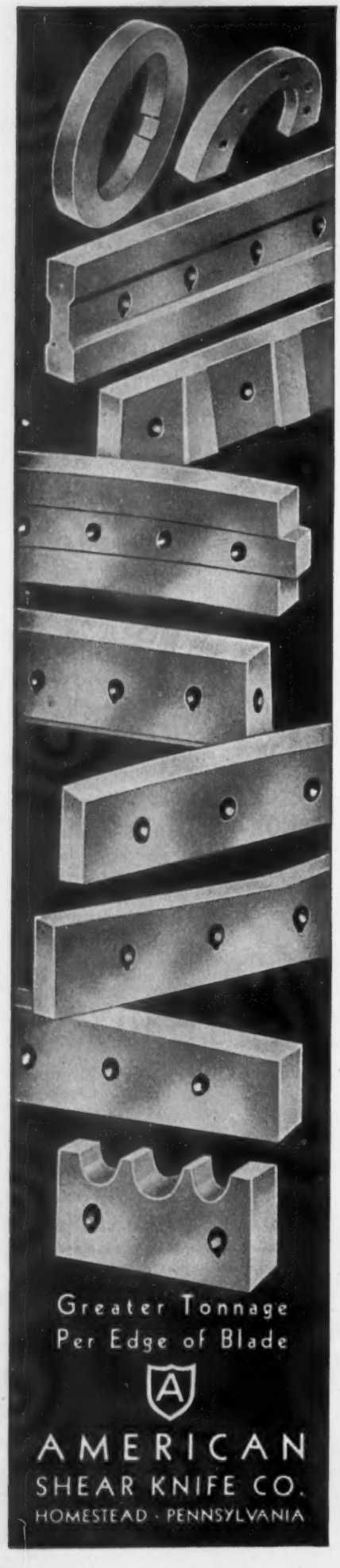

AISI Committee on Reinforced Concrete Research Reports on 3 Years' Progress

AMONG the major problems being investigated by American Iron and Steel Institute's Committee on Reinforced Concrete Research are six branches of structural research: Bond tests, anchorage studies, design stresses, effect of plastic flow and shrinkage, footing tests, and studies of torsional stresses. Also under contemplation by the committee is a highway and airfield research project.

The committee, as at present constituted, is composed of representatives of 21 companies producing either billet steel or rail steel concrete reinforcing bars. At its first meeting, in New York City, November, 1943, it was decided that program to be undertaken should cover a minimum of 3 years, with provisions for such extension as became necessary.

Substance of report to date on structural tests is as follows:

Bond Tests: There has been no general agreement as to what constitutes a proper means of classifying deformed or other types of bars as to bond characteristics. Committee has been instrumental in initiating preparation of standard form of test through American Concrete Institute Committee 208 on Bond Stress. Recommendations were published in February, 1945 Journal of American Concrete Institute. In the meantime, the AISI committee has under way at National Bureau of Standards a series of elimination pull-out tests in which not only new and modified types of deformed bars (about six in number) will be investigated, but also some presently available types of deformed bars.

Seven-eighths rounds in 17 different patterns are being used, and one brand of commercial portland cement, consistency of the latter being closely controlled to produce compressive strengths averaging 5500 psi at 28 days. Concrete specimens are 18 x 18 in. in cross section, with one 7/8-in. deformed bar cast horizontally in specimen, located 2 in. from top surface and a similar bar located 2 in. from bottom surface. Two lengths of bar embedment, 8 in. and 16 in., are included. Seventy-two hours after casting, specimen is cut in two parts, each 9 x 8 in. specimen then being tested as a pull-out specimen at the age of 28 days. Tests are made on 204 separate specimens.

After results have been studied, it is proposed to subject selected bars to standard bond test recommended by American Concrete Institute, which calls for testing of flexural or beam type specimens in which effect on bond or bar position in the rectangular section and pattern of deformations will be investigated as the only variables.

Anchorage Studies: It is part of program to determine to what extent it may be possible to eliminate hooking of bars in various types of structural members through the medium of the new deformed bar. Some economy and expedition of construction is expected to result. In accordance with majority of current design specifications, radii of semicircular hooks and their extension beyond point of curvature are rather rigidly limited. Committee quotes NBS in part as follows: "It has been found that deformation on the bars have a greater effect upon performance of hook anchorages than any of the factors now limited in specifications".

It is Committee's belief that efforts of producers will result in development of types of deformed bars with improved bond characteristics and general applicability to structural uses.

Design Stresses: Combined with the War Production Board's NE specifications limiting use of reinforcing bars to what might be termed an irreducible minimum, was a more or less arbitrary increase in design stresses, particularly tension and bond. Tensile stress increase was 20 per cent; bond, 10 per cent. Advisability of increasing design stresses from 20,000 to 24,000 psi has been questioned.

A research fellowship has been established at Bureau of Standards to study (1) effect of use of higher design stresses on deflection of structural members; (2) extent to which number or width of cracks is indicative of, and might be utilized as criterion to disclose, structural distress; (3) effect of ratio of span length to slab thickness on development of stress in both concrete and reinforcing steel.

Those who have studied problem generally agree that properly balanced design should call for considerably higher percentage of tensile steel without overstressing the concrete, with consequent reduction in both size and weight of structural members. Thorough study of problem has been undertaken by a leading technical society and studies at NBS will be designed to contribute data bearing on problem.

Effect of Plastic Flow and Shrinkage: Other phases of Bureau of Standards investigation will include long-time tests of slabs, designed to parallel those to be tested under usual conditions of third-point loadings. Increase in stresses in both concrete and reinforcing steel arising from "plastic flow" or "time yield" in concrete will be determind. Differentiation between stresses and deflections arising from shrinkage, as compared with those resulting from plastic flow, will be made.

Footing Tests: A co-operative project between Committee and University of Illinios. Purpose is to study performance of reinforced concrete square and rectangular isolated footings. Included are series of 20-wall type footings for comparison with wall-type footings in 1908-11. This type predominated in Talbot's (1913) investigations. Other

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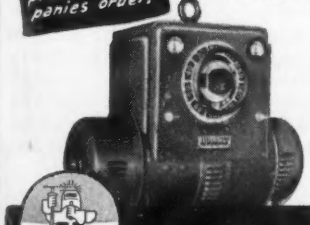

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more comprehensive series will include studies of a total of 160 seven-foot square full-size footings, some designed to fail in tension, others in shear or diagonal tension, and still others in bond. Other series will study special arrangements and distributions of steel in footings, including welded bar mats without hooked ends; sloped and stepped types, and rectangular footings never before studied.

Three compressive strengths of concrete are considered, 2000, 3000 and 4000 lb. Four bar sizes varying from 3/8 to 3/4-in., with plain and deformed bars of existing and new types, both new billet and rail steels, with and without hooks, will be included. Series investigating bond is expected to prove one of the most important.

Torsional Stress Studies: To be initiated as soon as practicable. To deal with torsional stresses set up in various types of structural members owing to unbalanced or variable loadings, such as on spandrel or elevator shaft or stairwell beams. Proper type of shear reinforcement appears to be one major question as yet unanswered. May have application to problems arising in bridge design.

Minute Strain Gage Has Many Applications

A strain gage no larger than a paper clip, known as SR-4 and manufactured by Southwark Division of Baldwin Locomotive Works, is said to provide important information for improved design of guns, airplanes, ships and other fighting equipment. Operation of the gage was demonstrated at a recent meeting of experts in the fields of aeronautics, railroading, shipbuilding, ordnance, civil engineering, etc., at Washington, D. C.

By cementing the gage around a gun barrel, the amount of strain taking place during firing can be recorded. Ships also can be studied for points of weakness during construction or operation and corrections made. Gages aid in studying bridge design. Applied to any part of a bridge, they record impact of moving traffic, showing where greatest strength is needed. Wire strain gage is expected to be useful in determining strength and efficiency of many new construction materials.

Synthetic Rubber Protects Helicopter Rotor Blades

Rubber material to protect high-speed helicopter rotor blades from abrasive effects of sand and rain has been developed by United States Rubber Co., Rockefeller Center, New York. Material is a strip of specially compounded synthetic rubber 18 ft long, which is cemented to leading edge of blade. United States Coast Guard pilots testing the material are said to have flown machines many hours in heavy rain without damage to blades. Fabric covering formerly used started to come off blades after 10 min.

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THE BUSINESS TREND

Materials Supply Sets Pace of Reconversion

THE DEGREE of success which industries attain in obtaining materials and manpower for civilian production will be an increasingly important factor in determining the level of industrial activity from now on.

In the latest week industrial operations have held relatively firm but signs are multiplying of shrinking war production so that as the weeks pass it appears continuance of high-level activity will be progressively dependent upon civilian goods production.

While the nation was geared to prosecution of a two-front war, industrial barometers were controlled very largely by military goods production. Now that some reconversion to peacetime products has been effected, the degree to which reconverted industries are successful in obtaining raw materials, components, and manpower will determine to considerable extent what the barometers of industrial activity will register.

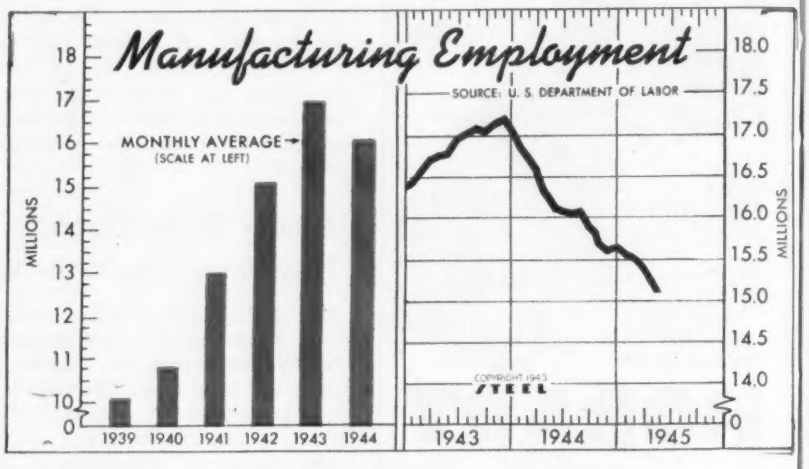
At the moment, uneven distribution of materials and manpower are handicaps to rapid reconversion. For instance, steel sheets, needed for automobiles, are in such strong demand for military requirements the supply situation in this product makes the civilian goods production outlook very uncertain.

Shortage of manpower still is a factor in industrial production despite recent cutbacks in the munitions program. However, indications are that the manpower situation will be eased materially before the end of the summer, so the chief concern of manufacturers now converting concerns supplies of materials.

CONSTRUCTION—The construction industry, major influence in business activity, will find government regulations, material and manpower shortage, and confused price trends, with the added possibility of transportation shortages, rather than a dearth of plans the real bottleneck in revival. F. W. Dodge Corp., for example, points out that it has spotted 99,638 specific construction projects contemplated for postwar execution in the 37 states east of the Rocky mountains. Combined value of those projects is $15,746,202,000.

STEEL—Steel ingot production in recent weeks has been fluctuating but has been around 90 per cent of capacity. Manpower shortage continues a major problem in the industry.

COAL OUTPUT—Manpower shortage still hampers bituminous coal production. Output from Jan. 1 through June 30, 1945 is 297,437,000 tons, compared with 319,647,000 tons from Jan. 1 through July 1, 1944. Thus, production this year is 22,210,000 tons or 6.9 per cent behind that for the corresponding period last year.



Factory Employment

(000 omitted)

	1945	1944	1943
January	15,555	16,825	16,423
February	15,517	16,735	16,599
March	15,375	16,559	16,747
April	15,103	16,309	16,774
May	.....	16,122	16,753
June	.....	16,093	16,908
July	.....	16,013	17,059
August	.....	16,023	17,182
September	.....	15,843	17,136
October	.....	15,692	17,194
November	.....	15,607	17,238
December	.....	15,632	17,080
Monthly Average	.....	16,121	16,924

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	88.5	92	90	96
Electric Power Distributed (million kilowatt hours)	3,978	4,353	4,327	3,941
Bituminous Coal Production (daily av.—1000 tons)	1,991	1,961	1,861	1,981
Petroleum Production (daily av.—1000 bbls.)	4,886	4,903	4,853	4,579
Construction Volume (ENR—unit $1,000,000)	$30.8	$46.5	$43.0	$18.9
Automobile and Truck Output (Ward's—number units)	14,365	19,115	19,580	14,600

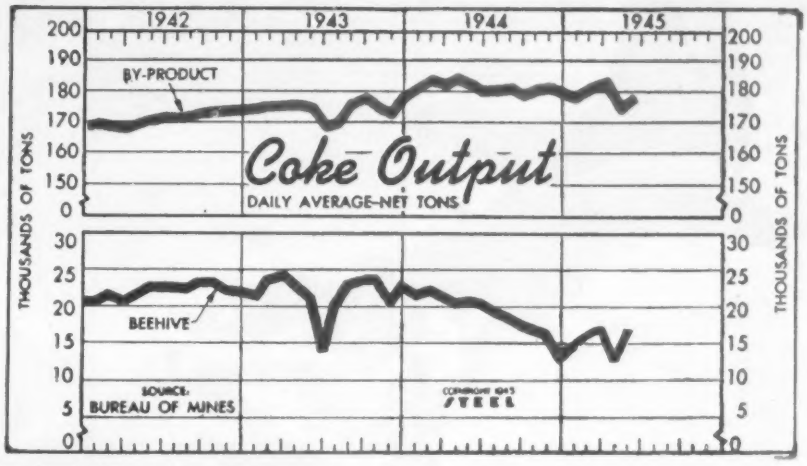
*Dates on request.

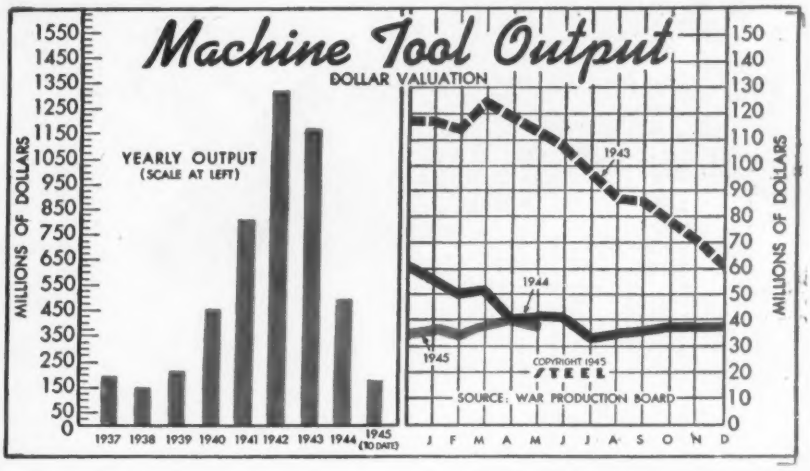
TRADE				
Freight Carloadings (unit—1000 cars)	753†	894	884	745
Business Failures (Dun & Bradstreet, number)	9	14	12	21
Money in Circulation (in millions of dollars)‡	$26,834	$26,628	$26,513	$22,598
Department Store Sales (change from like week a year ago)‡	+21%	+19%	+9%	+15%

†Preliminary. ‡Federal Reserve Board.

Coke Output
Bureau of Mines
(Daily Average—Net Tons)

	By-Product		Beehive	
	1945	1944	1945	1944
Jan.	179,879	181,501	14,745	21,933
Feb.	180,727	184,384	16,210	22,248
March	182,120	182,442	17,115	21,529
April	174,239	185,259	12,554	20,457
May	178,338	184,071	17,482	20,783
June	.....	181,891	.....	20,472
July	.....	181,506	.....	19,531
Aug.	.....	181,718	.....	18,572
Sept.	.....	179,234	.....	17,305
Oct.	.....	181,772	.....	16,994
Nov.	.....	182,383	.....	16,199
Dec.	.....	180,746	.....	13,066
Ave.	.....	182,359	.....	19,128





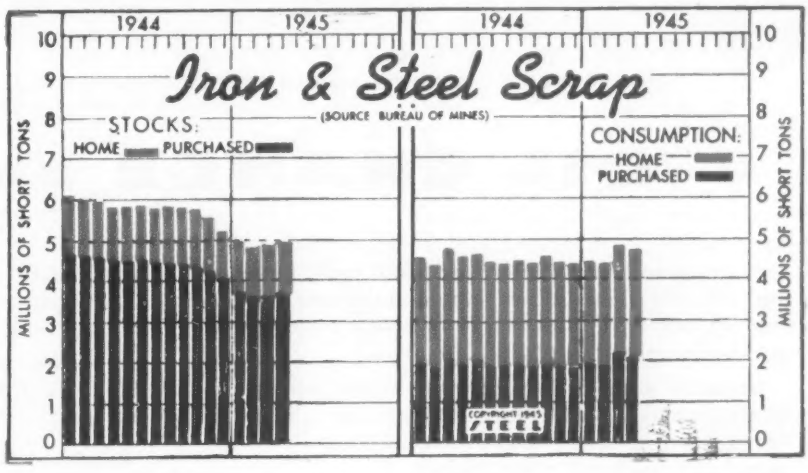
Machine Tool Output
(000 omitted)

	1945	1944	1943	1942
Jan.	$37,498	$56,363	$117,384	$83,547
Feb.	36,018	50,127	114,594	84,432
Mar.	39,374	51,907	125,445	98,358
Apr.	40,331	41,370	118,024	103,364
May	39,825	41,819	113,859	107,297
June	.....	41,471	108,736	111,090
July	.....	32,753	97,428	113,596
Aug.	.....	35,177	87,405	117,342
Sept.	.....	35 876	85,842	119,883
Oct.	.....	37 516	78,300	130,008
Nov.	.....	36,277	71,811	120,871
Dec.	.....	36,782	60,861	131,960

Year	
1944	497,438
1943	1,179,689
1942	1,321,862
1941	812,462
1940	450,000

Iron and Steel Scrap
Bureau of Mines
(Gross Tons—000 omitted)

	Consumers' Stocks			Total Consumption		
	1945	1944	1943	1945	1944	1943
Jan.	5,023	6,214	6,877	4,507	4,616	4,492
Feb.	4,901	6,134	6,871	4,209	4,414	4,178
Mar.	4,873	6,027	6,850	4,889	4,827	4,787
Apr.	4,907	5,932	6,918	4,668	4,629	4,642
May	....	5,966	6,905	....	4,683	4,723
June	....	5,991	6,916	....	4,460	4,493
July	....	5,909	6,860	....	4,423	4,670
Aug.	....	5,975	6,778	....	4,533	4,686
Sept.	....	5,953	6,613	....	4,471	4,657
Oct.	....	5,832	6,456	....	4,684	4,830
Nov.	....	5,624	6,391	....	4,527	4,581
Dec.	....	5,335	6,448	....	4,487	4,449
Mo. Ave.	....	5,908	6,740	....	4,563	4,599



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$10,606	$12,745	$11,582	$9,812
Federal Gross Debt (billions)	$259.1	$256.9	$241.5	$202.6
Bond Volume, NYSE (millions)	$20.3	$46.0	$44.1	$40.6
Stocks Sales, NYSE (thousands)	4,115	11,234	8,234	7,844
Loans and Investments (billions)†	$63.5	$63.0	$57.5	$55.0
United States Gov't. Obligations Held (millions)†	$46,543	$46,334	$42,842	$39,917

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$58.27	$58.27	$58.27	$56.73
All Commodities	105.9	105.9	106.1	104.1
Industrial Raw Materials†	118.7	118.6	118.9	114.6
Manufactured Products†	102.0	102.0	102.1	101.1

†Bureau of Labor's Index, 1926=100

NORTH AMERICAN AVIATION, INC., big name in the industry, changed to Shell Industrial Lubricants and solved a serious rusting problem in 30,000 pieces of producing equipment—without loss of production time!

OIL CHANGE *on the Fly*

At North American Aviation, Inc., RUST was "termiteing" 30,000 pieces of producing equipment vital in turning out P-51 Mustangs and other equally important planes.

Urgently needed: a corrective—to work on the fly! Every second on North American's production line is precious—balance of power in some faraway battle-sky may depend on it.

Shell Lubrication Engineers—called in to work with North American technicians—recommended use of Shell's Turbo Cleaner.

The suitable viscosity of this cleaner permits its use as the lubricating oil in hydraulic systems of machine tools and other equipment during a cleaning operation. With this double-feature oil, North American lost *not a single minute* of valuable production time.

Cleaning completed, three grades of high-quality Shell Tellus Oils were then used. These oils possess rarely found rust-preventive qualities. Unusual "wettability" prods them into penetrating rusted surfaces—loosening and dislodging particles of scale.

Shell Engineers also recommended coating machine areas above the oil level with Shell Ensis Oil. This protects metal from moisture in the air . . .

Result of these changes: complete elimination of this rust problem at the North American plant . . . tens of thousands of dollars saved . . . *more* fighting-mad Mustangs in the air.

Are you sure the machines in your plant are getting the benefit of all that's new in lubrication as it develops? Contact Shell Oil Co., Incorporated, 50 W. 50th St., New York 20, N. Y., or 100 Bush St., San Francisco 6, Cal.

SHELL

SHELL TELLUS OILS

WPB Seeks Cure for Tight Sheet, Strip Situation

Freezes third quarter orders, then releases July and August schedules . . . Cut in allowed inventory may provide some civilian tonnage

SERIOUS situation in the sheet and strip industry, having a bearing on reconversion, is increasingly recognized by the War Production Board.

Ten days ago sheet and stripmakers' order books for third quarter were frozen but late last week this order was partially rescinded, books being reopened for July and August for all consumers and through entire third quarter for the smaller buyers.

The original order covered hot-rolled sheets and strip, hot-rolled pickled, cold-rolled, galvanized and silicon sheets for entire third quarter.

Reason for the change was that the freeze came too late to be of material effect on mill schedules and also because the prior order cutting inventories from 60 to 45 days is expected to result in cancellations that will ease the tight supply materially.

Indications are that manufacturers producing less than $50,000 worth of goods will receive supplies for civilian goods fairly promptly, being given preferred treatment under Regulation 27, under the provision that Z-3 orders, applying in such cases, may be shipped before all unrated orders, after CMP orders have been filled.

Meanwhile sheet mills are booked up for the remainder of the year and such cancelations as they have received have affected remote deliveries almost exclusively, little relief being seen on nearby deliveries. Practically all sheet orders on roling schedules are rated, with a few having priorities assistance to meet essential demand for special purposes. Unrated orders are being held in abeyance until it is possible to schedule them without interfering with rated business.

Estimated national steel production rate for last week was 90 per cent of capacity, a rise of 1½ points. No district showed a decline from the prior week. Cleveland advanced 2 points to 78 per cent, eastern Pennsylvania 1 point to 87, St. Louis 3 points to 78, Buffalo 11 points to 90½ and Wheeling 11 points to 91½ per cent. Other districts maintained unchanged rates, as follows: Chicago 94½, Pittsburgh 87, Youngstown 90, Cincinnati 91, New England 85, Birmingham 95, Detroit 80.

Steel ingot production during first half totaled 43,180,223 net tons, a drop of 1,963,000 tons from output in first half last year, the effect of weather, transportation interruptions and labor troubles. Output was more than two-thirds that of all 1929, the record peacetime production year, but was lower than any half year since 1942. June production was 6,868,717 tons, which was 582,086 tons less than in May, partially due to the shorter month.

Finished steel shipments by the United States Steel Corp. in June were 1,602,882 net tons, 195,105 tons less than in May and 134,887 tons less than in June, last year. Six months cumulative shipments totaled 10,124,959 tons, compared with 10,632,854 tons in the corresponding period in 1944.

In pig iron the supply is practically even with demand, with tightness developing in spots, though no distress has been met so far. Foundries are making some progress in increasing castings output as labor shortage is slightly relieved, and are seeking additional iron for inventory to meet expected further increase.

Scrap supply is tight, as acute as at any time during the war in some areas. Greatest shortage appears in industrial material, reduced by war cutbacks. Most steelmakers are in the market for material and all signs of weakness have disappeared, springboards being paid in most instances. Permission has been given some open-hearth melters to buy electric furnace scrap for their furnaces. Prices of borings and turnings continue to rise and are close to ceilings in most areas.

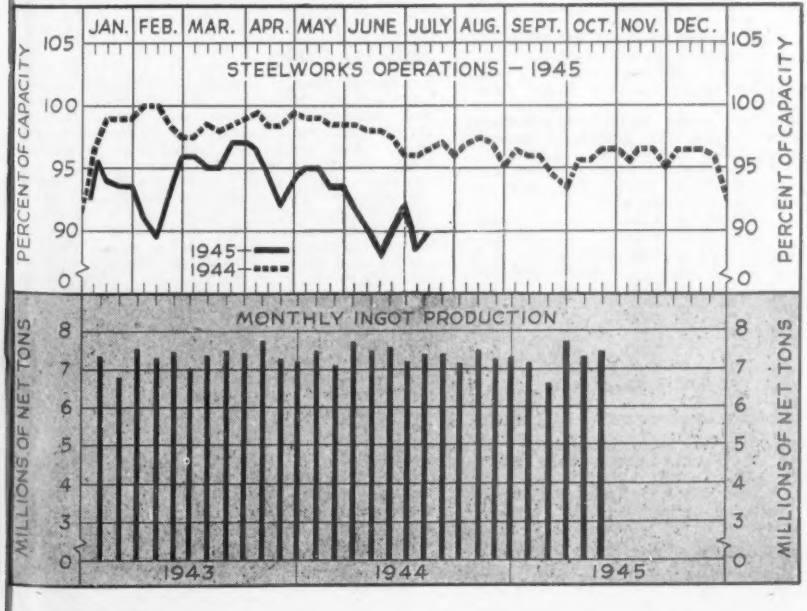
Average composite prices of steel and iron products show no change, being maintained at ceilings. Finished steel composite is $58.27, semifinished steel $37.80, steelmaking pig iron $24.05 and steelmaking scrap $19.17.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended July 14	Change	Same Week 1944	Same Week 1943
Pittsburgh	87	None	90.5	97
Chicago	94.5	None	98.5	98
Eastern Pa.	87	+1	95	93
Youngstown	90	None	96	94
Wheeling	91.5	+11	102	87
Cleveland	78	+2	91	92.5
Buffalo	90.5	+11	90.5	90.5
Birmingham	95	None	95	95
New England	85	None	89	95
Cincinnati	91	None	86	89
St. Louis	78	+3	79.5	95
Detroit	80	None	85	92
Average	90	+1.5	96.5	*97

*Based on steelmaking capacities as of these dates.



COMPOSITE MARKET AVERAGES

	July 14	July 7	June 30	One Month Ago June, 1945	Three Months Ago April, 1945	One Year Ago July, 1944	Five Years Ago July, 1940
Finished Steel	$58.27	$58.27	$58.27	$58.27	$57.55	$56.73	$56.73
Semifinished Steel	37.80	37.80	37.80	36.45	36.00	36.00	36.00
Steelmaking Pig Iron	24.05	24.05	24.05	24.05	23.55	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.07	19.17	19.17	18.65

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Averge for Last Month, Three Months and One Year Ago

Finished Material

	July 14, 1945	June, 1945	April, 1945	July, 1944
Steel bars, Pittsburgh	2.25c	2.25c	2.15c	2.15c
Steel bars, Chicago	2.25	2.25	2.15	2.15
Steel bars, Philadelphia	2.57	2.57	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.25	2.25	2.20	2.10
Plates, Philadelphia	2.30	2.30	2.25	2.15
Plates, Chicago	2.25	2.25	2.20	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.70	3.70	3.65	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.70	3.70	3.65	3.50
Bright bess., basic wire, Pittsburgh	2.75	2.75	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.90	2.90	2.80	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$36.00	$36.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	36.00	36.00	34.00	34.00
Rerolling billets, Pittsburgh	36.00	36.00	34.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.15	2.15	2.00	2.00

Pig Iron

	July 14, 1945	June, 1945	April, 1945	July, 1944
Bessemer, del. Pittsburgh	$26.19	$26.19	$26.19	$25.19
Basic, Valley	24.50	24.50	24.50	23.50
Basic, eastern del. Philadelphia	26.34	26.34	26.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	25.69	25.69	25.69	24.69
No. 2 foundry, Chicago	25.00	25.00	25.00	24.00
Southern No. 2, Birmingham	21.38	21.38	21.38	20.38
Southern No. 2 del. Cincinnati	25.30	25.30	25.30	24.30
No. 2 fdry., del. Phila.	26.84	26.84	26.84	25.84
Malleable, Valley	25.00	25.00	25.00	24.00
Malleable, Chicago	25.00	25.00	25.00	24.00
Lake Sup., charcoal, del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.19	25.19	25.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.33

Scrap

Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.45	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke

Connellsville, furnace, ovens	$7.50	$7.50	$7.00	$7.00
Connellsville, foundry ovens	8.25	8.25	7.75	7.75
Chicago, by-product fdry., del.	13.35	13.35	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941, Feb. 4, 1942 and May 21, 1945. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill Kaiser Co. Inc., $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop., $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $36; Detroit, del. $38; Duluth (bil) $38; Pac. Ports, (bil) $48. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $38.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $42. Detroit, del. $44; Duluth, billets, $44; forg. bil. f.o.b. Pac. ports, $54.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles).

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $36. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—⅜ in. inclusive, per 100 lbs., $2.15. Do., over ⅜—⅞-in., incl., $2.30; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific ports $0.50. (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham base 20 tons one size, 2.25c; Duluth, base 2.35c; Mahoning Valley 2.32½c; Detroit, del. 2.35c; Eastern Mich. 2.40c; New York del. 2.59c; Phila. del. 2.57c; Gulf Ports, dock 2.62c; Pac. ports, dock 2.90c. (Calumet Steel Division, Borg-Warner Corp., and Joslyn Mfg. & Supply Co. may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.35c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		4100 (.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00c, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 2.35c on hot carbon sheets, nearest eastern basing point.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.70c; Granite City, base 3.80c; New York del. 3.94c; Phila. del 3.87c; Pacific ports 4.25c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.85c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.85c; Granite City, base 2.95c; Detroit, del. 2.95c; eastern, Mich. 3.00c; Pacific ports 3.50c; **20-gage;** Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.45c; Detroit del. 3.55c; eastern Mich. 3.60c; Pacific ports 4.10c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.30c	4.05c	3.30c
Armature	3.65c	4.40c	3.75c
Electrica	4.15c	4.90c	4.25c
Motor	5.05c	5.80c	5.15c
Dynamo	5.75c	6.50c	5.85c
Transformer			
72	6.25c	7.00c	.....
65	7.25c	8.00c	.....
58	7.75c	8.50c	.....
52	8.55c	9.30c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.25c; New York, del. 2.44c; Phila., del. 2.30c; St. Louis, 2.49c; Boston, del. 2.57-82c; Pacific ports, 2.80c; Gulf ports, 2.60c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.50c; Pacific ports, 4.15c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.35c f.o.b. St. Louis. Geneva Steel Co., 3.25c, Pac. ports); Kaiser Co. Inc., 3.20c f.o.b. Los Angeles).

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth).

Bright basic, bessemer wire 2.75c
Spring wire 3.35c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.90; galvanized, $2.55; Pac. ports ..... $3.40 and $3.05

Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.20c

Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.55c

Woven fence, 15½ gage and heavier, per base column ..... .67c

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	54½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-19	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.08	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2½"	12	16.01	18.45	15.16	.....
2¾"	12	17.54	20.21	16.58	26.57
2⅞"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.36
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.98	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $45.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates, $46 net ton, base, Standard spikes, 3.25c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung.	Chr.	Van.	Moly.	Pitts. base per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

CHROMIUM NICKEL STEEL

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	48.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
‡321	29.00	34.00	41.00	29.25	36.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50

STRAIGHT CHROMIUM STEEL

403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

STAINLESS CLAD STEEL (20%)

304	.....	‡‡18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller ..... 65½ off
Do., ⅝ and ⅞ x 6-in. and shorter ..... 63½ off
Do., ¾ to 1 x 6-in. and shorter ..... 61 off
1⅛ and larger, all lengths ..... 59 off
All diameters, over 6-in. long ..... 59 off
Tire bolts ..... 50 off
Step bolts ..... 56 off
Plow bolts ..... 65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
7/16-inch and less	62	64
½-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	

Hexagon Cap Screws

Upset 1-in., smaller ..... 64 off
Milled 1-in., smaller ..... 60 off

Square Head Set Screws

Upset, 1-in., smaller ..... 71 off
Headless, ¼-in., larger ..... 60 off
No. 10, smaller ..... 70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural 3.75c
7/16-inch and under ..... 65-5 off
Wrought Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l. ..... $2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*7.50
Connellsville, foundry	8.00- 8.50
New River, foundry	9.00- 9.25
Wise county, foundry	7.75- 8.25
Wise county, furnace	7.25- 7.75

By-Product Foundry

Kearney, N. J., ovens	12.62
Chicago, outside delivered	12.60
Chicago, delivered	13.36
Terre Haute, delivered	13.10
Milwaukee, ovens	13.35
New England, delivered	14.25
St. Louis, delivered	†13.32
Birmingham, delivered	10.50
Indianapolis, delivered	13.10
Cincinnati, delivered	12.82
Cleveland, delivered	12.80
Buffalo, delivered	13.05
Detroit, delivered	13.32
Philadelphia, delivered	12.89

*Operators of hand-drawn ovens using trucked coal may charge $8.00, effective May 26, 1945.
†13.85 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.99c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$39.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.144[11]	4.715	6.012[20]	6.012[20]
New York	3.833[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.103[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.103[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[15]	4.872[25]	4.072[21]	4.772	5.816[20]	5.860[20]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[25]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.891[1]	5.196[17]	4.841[25]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[15]	4.40[10]	3.75[21]	4.669	5.60[20]	5.75[20]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[15]	4.30[10]	3.65[21]	4.35	5.60[20]	5.75[20]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[15]	4.40[24]	3.75[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[15]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[15]	4.40[24]	3.75[21]	4.45[21]	5.60[20]	5.65[20]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.65[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[13]	4.500[24]	3.800[21]	4.659	5.93[20]	5.98[20]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[19]	5.443[24]	4.443[12]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	6.391[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[13]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[15]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[13]	4.20[24]	3.75[21]	4.65	5.75[20]	5.85[20]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.787[1]	3.787[1]	5.272[13]	4.337[24]	3.887[21]	4.787	5.987[20]	6.087[20]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[13]	4.568[24]	3.98[21]	4.78	6.08[20]	6.18[20]
St. Paul	3.76[3]	3.81[3]	3.81[3]	5.41[3]	3.51[3]	3.86[3]	3.86[3]	5.257[13]	4.46[24]	4.361[21]	5.102	6.09[20]	6.19[20]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[13]	4.347[24]	4.031[21]	4.931	6.131[20]	6.231[20]
Memphis, Tenn.	4.015[5]	4.065[5]	4.065[5]	5.78[5]	3.965[5]	4.215[5]	4.215[5]	5.265[13]	4.78[24]	4.33[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[1]	3.45[1]	3.70[1]	3.70[1]	4.75[15]	4.852[24]	4.54	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[30]	5.079[10]	4.60[21]	5.420	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.763[3]	4.318[3]	4.318[3]	5.313[30]	4.10[10]	3.65[21]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[4]	6.75[4]	6.00[13]	7.20[4]	5.583[21]	5.613	5.85[20]	5.95[20]
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[15]	7.30[15]	5.333[21]	7.383	8.304[20]	8.404[20]
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.80[27]	5.75[15]	6.60[15]	5.533[15]	.....	.....	.....
Tacoma	4.35[3]	4.45[3]	4.75[3]	6.50[3]	4.65[3]	4.25[3]	5.45[3]	5.95[15]	7.60[15]	5.783[21]	.....	8.00[20]	.....
Seattle	4.35[3]	4.45[3]	4.75[3]	6.50[3]	4.65[3]	4.25[3]	5.45[3]	5.95[15]	7.05[15]	5.783[21]	.....	8.00[20]	.....

*Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 18 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [23]—1500 to 1999 pounds; [24]—1000 to 39,999 pounds; [25]—400 to 1499 pounds; [26]—1000 to 1999 pounds; [27]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [30]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton. 51½% (Natural)
Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50

Domestic (seller's nearest rail)

48% 3:1	52.80
less $7 freight allowance	

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

Designation	Chemical Composition Limits, Per Cent (Extras for alloy content) C	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Bars per 100 lb.	Basic open-hearth Billets per GT	Electric furnace Bars per 100 lb.	Electric furnace Billets per GT
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.00	$25.50	$27.00	$26.50
Newark, N. J., del.	27.53	27.03	28.53	28.03
Brooklyn, N. Y., del.	28.50	.....	.....	29.00
Birdsboro, Pa., base	26.00	25.50	27.00	26.50
Birmingham, base	†21.38	†20.00	26.00	.....
Baltimore, del.	26.61	.....	.....	.....
Boston, del.	26.12	.....	.....	.....
Chicago, del.	25.22	.....	.....	.....
Cincinnati, del.	25.06	23.68	.....	.....
Cleveland, del.	25.12	24.24	.....	.....
Newark, N. J., del.	27.15	.....	.....	.....
Philadelphia, del.	26.46	25.96	.....	.....
St. Louis, del.	25.12	24.24	.....	.....
Buffalo, base	25.00	24.00	26.00	25.50
Boston, del.	26.50	26.00	27.50	27.00
Rochester, del.	26.53	.....	27.53	27.03
Syracuse, del.	27.08	.....	28.08	27.58
Chicago, base	25.00	24.50	25.50	25.00
Milwaukee, del.	26.10	25.60	26.60	26.10
Muskegon, Mich., del.	28.19	.....	.....	28.19
Cleveland, base	25.00	24.50	25.50	25.00
Akron, Canton, O., del.	26.39	25.89	26.89	26.39
Detroit, base	25.00	24.50	25.50	25.00
Saginaw, Mich., del.	27.31	26.81	27.81	27.31
Duluth, base	25.50	25.00	26.00	25.50
St. Paul, del.	27.63	27.13	28.13	27.63
Erie, Pa., base	25.00	24.50	26.00	25.50
Everett, Mass., base	26.00	25.50	27.00	26.50
Boston, del.	26.50	26.00	27.50	27.00
Granite City, Ill., base	25.00	24.50	25.50	25.00
St. Louis, del.	25.50	25.00	.....	25.50
Hamilton, O., base	25.00	24.50	.....	25.00
Cincinnati, del.	25.44	25.61	.....	26.11
Neville Island, Pa., base	25.00	24.50	25.50	25.00
§Pittsburgh, del. No. & So. sides	25.69	25.19	26.19	25.69
Provo, Utah, base	23.00	22.50	.....	.....
Sharpsville, Pa., base	25.00	24.50	25.50	25.00
Sparrows Point, base	26.00	25.50	.....	.....
Baltimore, del.	26.99	.....	.....	.....
Steelton, Pa., base	.....	25.50	.....	26.50
Swedeland, Pa., base	26.00	25.50	27.00	26.50
Philadelphia, del.	26.84	26.34	.....	27.34
Toledo, O., base	25.00	24.50	25.50	25.00
Youngstown, O., base	25.00	24.50	25.50	25.00
Mansfield, O., del.	26.94	26.44	27.44	26.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. †For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base)	$30.50
6.51-7.00	$31.50
7.01-7.50	32.50
7.51-8.00	33.50
8.01-8.50	34.50
8.51-9.00	35.50
9.01- 9.50	36.50
9.51-10.00	37.50
10.01-10.50	38.50
10.51-11.00	39.50
11.01-11.50	40.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Electric Furnace Ferrosilicon: Sil. 14.01 to 14.50%, $45.50; each additional .50% silicon up to and including 18% add $1; low impurities not exceeding 0.05 Phos., 0.40 Sulphur, 1.00% Carbon, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$34.00
Chicago, del.	37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$24.50
Valley base	24.50

Low Phosphorus

Basing points: Birdsboro, Pa., $30.50; Steelton, Pa., and Buffalo, N. Y., 30.50 base; 31.74, del., Philadelphia. Intermediate phos., Central Furnace, Cleveland, $27.50

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky.	$68.50

First Quality

Pa., Ill., Md., Mo., Ky.	54.40
Alabama, Georgia	54.40
New Jersey	59.35
Ohio	47.70

Second Quality

Pa., Ill., Md., Mo., Ky.	49.35
Alabama, eorgia	40.30
New Jersey	52.00
Ohio	38.15

Malleable Bung Brick

All bases	63.45

Silica Brick

Pennsylvania	54.40
Joliet, E. Chicago	62.45
Birmingham, Ala.	54.40

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	32.90
Wire cut	30.80

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. (After Aug. 29 base price any grade $30.) war chemicals.

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton, f.o.b. cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer; Rockdale or Rockwood, Tenn., where Tennessee Products Co. is seller; Birmingham, Ala., where Sloss-Sheffield Steel & Iron Co. is seller; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central, 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R.R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome: Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom. 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium; 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western, spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max., sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract, ton lots, $1.89, less, $2.01, eastern, freight allowed; $1.903 and $2.023 central, $1.935 and $2.055 western, spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot, up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide approx. 2%, or Red Cake: Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed, per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract, ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309 Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.60c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c, eastern, freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c central, 13.20c and 13.90c; western 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c, 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 to c.l., 35c; central 34.25c and 36c; western, 34.55c and 38.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Spot, carlots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder: spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15% net ton to carload, 8c lb. f.o.b. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75c; ton lots 6.50c. Spot ½ cent higher.

Simanal: (Approx. 20% each Si., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 5c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 150 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 2 Bundles	18.75
No. 3 Bundles	14.75-15.25
Mixed Borings, Turnings	12.50-13.00
Machine Shop Turnings	12.50-13.00
Billet, Forge Crops	23.75
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turnings	8.50- 9.00
Mixed Borings, Turnings	8.50- 9.00
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	12.00-12.50
Short Shovel Turnings	15.00
Mixed Borings, Turnings	13.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	13.50-14.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06
No. 2 Heavy Melt. Steel	14.06
No. 1 Bundles	14.06
No. 2 Bundles	14.06
No. 1 Busheling	14.06
Machine Shop Turnings	6.50- 7.00
Mixed Borings, Turnings	6.50- 7.00
Short Shovel Turnings	9.75-10.25
Chemical Borings	13.81
Low Phos. Clippings	16.56
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

Boston Differential 99 cents higher, steel-making grades; Providence $1.09 higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Short Shovel Turnings	16.50-17.00
Mach. Shop Turnings	13.50-14.00
Mixed Borings, Turnings	14.50-15.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	21.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$21.00
No. 1 Heavy Melt Steel	20.00
No. 2 Comp. Bundles	20.00
Short Shovel Turnings	15.50-16.00
Cast Iron Borings	14.50-15.00
Machine Shop Turnings	13.00-13.50
Low Phos. Plate	22.50

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	13.00-14.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet, Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails, Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn.	18.75
No. 3 Galv. Bundles	16.75
Machine Turnings	13.25-13.75
Mix. Borings, Sht. Turn.	13.25-13.75
Short Shovel Turnings	14.00-14.50
Cast Iron Borings	13.25-13.75
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	12.50
Short Shovel Turnings	15.50
Mixed Borings, Turn.	12.50
Cast Iron Borings	14.50
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	7.00- 7.50
Short Shovel Turnings	10.50-11.00
Cast Iron Borings	9.50-10.00
Low Phos Plate	19.32-19.82
No. 1 Cast	20.00
Heavy Breakable Cast	13.50-14.00

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	$17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	9.50
Shoveling Turnings	11.00
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25

(Cast grades f.o.b. shipping point)

Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	7.50- 8.00
Shoveling Turnings	9.50-10.00
Cast Iron Borings	9.50-10.00
Mixed Borings, Turnings	8.50- 9.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	6.90
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	16.00

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low-grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American, bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224-lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: OPA ceiling prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz., $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193. Open market, spot, New York, nominal for 50 to 100 flasks; $158 to $163 in smaller quantities.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2%, 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze			
90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%		8.875	8.375
Muntz metal		7.750	7.250
Nickel Sil, 5%		9.000	4.625
Phos. br., A, 1 ...%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb., 11, 14, etc., 3 to 3.50c lb. All other high-grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb. borings and turnings one cent less than segregated.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 192

Freezing of sheet and strip orders for third quarter has had little effect on the situation and mill schedules are still loaded, with a heavy carryover from second quarter to be rolled before actual third quarter tonnage can be started. Most shipments in third quarter are expected to be of rated orders, with little chance seen for any considerable tonnage available for civilian goods unless priority assistance is given.

Pittsburgh — Since hot-rolled sheets and strip, heavier than 16 gage, can still be booked for possible shipment this quarter there is an outside chance that unrated orders that come within this specification can be included in rolling schedules during the period. However, over 95 per cent of flat-rolled steel tonnage shipped this quarter is expected to be on rated orders, despite the fact that 40 to 50 per cent of current bookings involve unrated tonnage for many household appliances. The 25 per cent reduction in consumers' inventories is expected to force through some order cancellations, which factor, combined with the indicated increase in war contract cutbacks and cancellations, may make it possible for WPB to rescind its order freezing sheet and strip steel order books for this quarter. Under present set-up mills are required to report to WPB Steel Division each week on the cancellations of all tonnage scheduled to be shipped in the third quarter.

Carryover tonnage on sheet and strip represented from 10 days to over a month production on July 1. Lack of storage facilities and unfavorable atmospheric conditions in the Pacific theater led sellers to anticipate a continued heavy demand for shell containers despite the sharp reduction in the ammunition program. Military requirements for drum stock also remain high, with one agency running into difficulty placing 30,000 tons for third quarter delivery, while a steady increase in galvanized sheet tonnage is also needed for Nissen huts. There is considerable need for additional flat-rolled finishing capacity to meet the huge pent-up requirements for civilian goods which under present conditions must be superimposed on war orders. However, no such expansion has been announced yet for this district.

While outlook for a general switch to civilian goods production this quarter is not encouraging, some companies are making good headway. The Westinghouse Electric Corp. is already producing two new models of all-steel cabinet electric refrigerators for commercial use, the first since the beginning of the war.

A new company, the Washington Steel Corp., Washington, Pa., expects to be in production on stainless steel sheets and strip up to 37 inches wide, in gages ranging from 0.003 to 0.093, by March of next year. Military demand for stainless steel products has been reduced substantially, largely resulting from cutbacks in the aircraft program.

Boston—Orders under Z-3, small manufacturers, and any for July openings are exempt from the freezing of third quarter rolling mill orders; openings created in August or September by cancellations, rescreening or other recent WPB actions directed toward avoiding acute shortage of sheets and strip for reconversion will be filled by OPA. Tonnage involved in above exemptions is small. On the surface, at least, prospects for unrated orders before late fourth quarter are not enhanced by recent moves. Producer schedules are filled on narrow cold strip for October-November. All open space that may be forthcoming will not be available for unrated volume for there is considerable war tonnage still unplaced for third quarter, notably in sheets. Backlogs must be subjected to sharper cuts than appears likely, to warrant optimism as to unvalidated volume which has backed up heavily. Priority assistance is appearing for some programmed products, washing machines, refrigerators and table flatware and pressure is growing for similar treatment from other industries, automotive included. Effect of the freeze in third quarter orders is nominal, as mills were booked through that period.

Cleveland — Sheet mills continue to labor under a heavy backlog, which is not relieved by cancellations, although the latter are expected to become heavier during the current quarter. A leading producer cannot promise better than early next year. Orders continue to be filed and in the experience of one mill 75 per cent are rated. Unrated orders are not being entered and simply accumulate without being processed. Labor is short in the finishing departments, especially in cold finishing, which hampers output.

Buffalo — Indications that future de-

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livery schedules on sheet and strip for the war effort may be revised in favor of civilian orders appeared this week as one of the top producers reported a moderate shipment of sheets to a Detroit auto manufacturer. Although future deliveries depend upon relaxation of controls, the tightened supply situation seems to have eased slightly.

Cincinnati — Orders for unrated sheet tonnage continue to pile up at district mills although requirements of the war programs apparently are crowding out this business for last half and there is no evidence of easing. Cutbacks and cancellations have been comparatively minor, at times serving to decrease the overload. However, in many cases other rated orders were substituted. The increase in unrated orders may be interpreted as a gesture in anticipation of sharper reductions in military programs.

St. Louis — Sheets are still under heavy pressure, and an increasing manpower shortage is delaying many shipments. Changeover of one mill from plates to sheets, requiring more finishing labor, has seriously interfered with sheet shipments.

New York — While scattered openings result from freezing of third-quarter schedules, reduction of inventory limits, rescreening of orders and other WPB moves aimed at relieving the jam in sheets and strip, notably the former, evidence is still lacking that substantial tonnage will be available for reconversion needs during that period without priorities assistance, further deep cancellations at mill levels or drastic revisions in backlog positions. There still remains important war tonnage to be placed for third quarter rolling, including large hot-rolled carbon drum stock tonnage for the army, requirements for near half-million drums. Not by any means will uncertain and limited openings be available for unrated orders exclusively.

Before the freeze, mills were unable to book orders for third quarter delivery in lighter gages, No. 16 and up, promises ranging well into fourth quarter and through the balance of the year. About the best under the warehouse load is October for hot-rolled carbon sheets, December for hot-rolled pickled, and beyond with most producers for all others, also cold-finished. Unrated inquiry continues brisk with duplication in orders apparently heavier in sheets, on an if and when basis, than in most products. This is confined to the fabricating end largely.

Although extensions in deliveries are less apparent in firm schedules, an exception is silicon sheets, in which a tightening situation is developing with some mills. This is due to a low production directive, sustained, or somewhat freer use given war ratings, and a strong civilian demand for prospective reconversion. For the latter, same holds to considerable degree for enameling and stainless. Some mills are now into first quarter on silicon sheets. With some fabricators getting priority assistance for programmed quotas, there is some pressure for similar treatment by others.

Chicago — Sheet mills face a critical situation, with deliveries extended into late first quarter and current demand exceeding reasonable limits. WPB directives constantly set back schedules, which under the present load outlook, give slight prospect for sheetmakers to participate in new business soon. One mill a few days ago received a substantial directive for galvanized sheets. Included in orders which consumers wish to place is much unrated tonnage, and the latter business must either be refused or taken on a basis of scheduling when conditions permit.

Sheet-Strip Supply May Be Reconversion Bottleneck

(*Concluded from Page 87*)

the urgent requirements of such industries during the two-front war were considerably higher than will be needed for the Japanese war.

Fourth quarter allocations of CMP steel, Mr. Krug said, will be carefully adjusted to the real needs of war and urgent war essential activities to insure that increased production of civilian products will be speeded on an unrated basis. He pointed out that it is desirable to make available the maximum amount of "free" steel from now on, to place all civilian production on an equal basis.

The WPB chief emphasized that reconversion products can only be manufactured from the materials released by munitions cutbacks. These cutbacks

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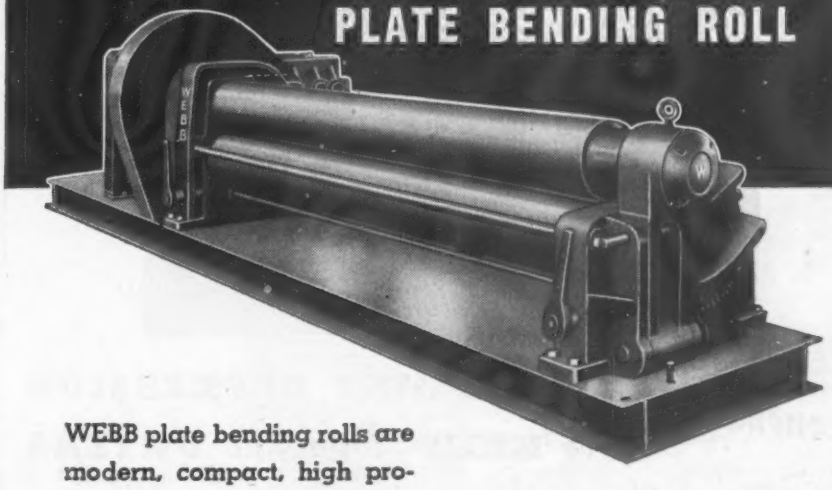

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and releases of material will be gradual. While many things are tight right now as we enter the third quarter, most of them will become freer month by month. However, some materials, such as textiles, lumber and tin, will continue tight for some time to come.

Steel Bars . . .

Bar Prices, Page 192

Bar producers have not yet received any considerable tonnage of cancellations resulting from ammunition cutbacks but expect much larger reductions later in third quarter. Most barmakers now are booked into November and December, depending on bar sizes and the situation of the individual mill. Little effect from cancellations is expected for third quarter, most of the reduction likely to be effective in fourth quarter. Unrated tonnage is not being scheduled, although it is possible some may be given place in late third quarter rollings.

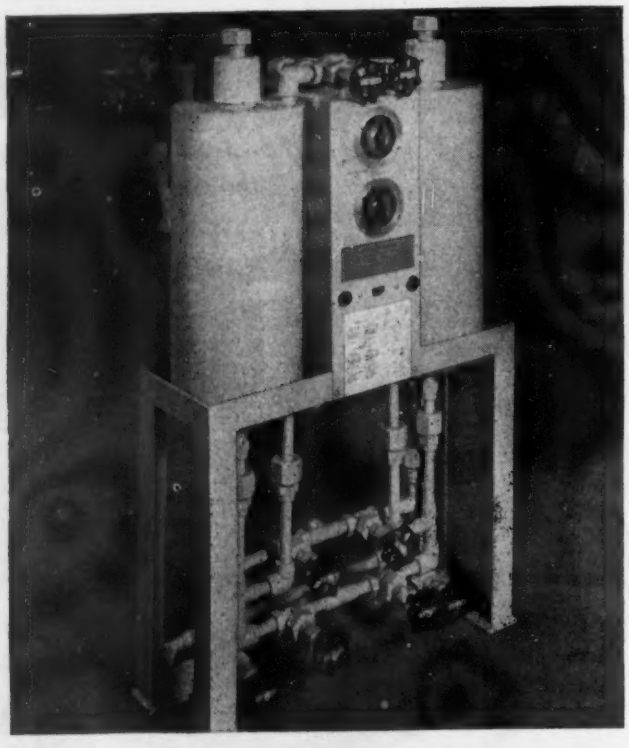
Pittsburgh — Producers here expect to be most affected by the 50 per cent reduction in the artillery shell program and the more recent 20 per cent reduction in medium artillery ammunition components, for this area received by far the largest portion of orders for these programs. Sellers have not been able to determine the full effect of these cutbacks, for contractors have been slow in cancelling mill orders. However, most of the tonnage expected to be canceled is likely to affect orders now scheduled for fourth quarter delivery. Cold drawers may feel effect of the ammunition cutbacks early this quarter, however most are booked into November and have nothing to offer before December and January on large sizes. Cutbacks in the aircraft and combat tank program have opened gaps in rolling schedules for hot-rolled and cold-drawn alloy bars for late August and September delivery. There is some possibility that small diameter carbon bars and cold-finished items may be available on an unrated tonnage basis this quarter.

Cleveland — Bar producers are busy with heavy schedules, deliveries depending on the individual mill and size of bars. Most relief has been the result of shell cancellations, but these mainly affected more remote deliveries, not reducing demand for nearby delivery. Leading producers in this area can promise delivery for December as an average, but in some larger diameters are able to fit in some tonnage in October and November. Most current orders are for rated tonnages. Unrated orders are not being scheduled, simply accumulating until gaps appear into which they can be fitted. Larger cancellations are expected to be met later in the quarter, which may have greater effect on backlogs for nearer delivery.

St. Louis — Pressure for merchant bars is considerable. Cancellations are few and are welcomed by most bar producers. The manpower shortage continues as a serious factor. Reinforcing bars, like all construction materials, are in light demand here.

New York—Hot-rolled alloy bars, electric furnace and open-hearth grades, are available for August delivery, but with potential automotive volume overhanging on a delivery basis, schedules may become more extended. Cold-drawn alloy and heat-treated stock is generally in October and November. Carbon bar deliveries are also in fourth quarter, some sizes in September. Cancellations in hot carbon bars have affected rail mills more than bar units in some cases. Cold-drawn cancellations are still unimpressive; demand for rockets is heavy. Also bar cancellations have been greatest in shell steel, which has eased the semifinished situation, but not bar mills to the same degree. Warehouse orders for bars have not slackened much.

Philadelphia — Cancellations have not yet cut deeply enough into backlogs of rated tonnage to warrant optimism as to third quarter supply of hot or cold-rolled carbon bars in any range of sizes. Hot-rolled alloy bars will be available with some producers unless unforeseen validated orders appear in heavier volume. Cutbacks in bars in aggregate have been substantial but for most part have not affected nearby schedules. Chain fabricators are among those taking fewer bars. Cancellations of cold-drawn are still relatively light, while among heavier products demand for rockets is maintained and in some instances increasing. Shipbuilding requirements sag, as well as numerous fabricated products for war, but an increase in car building and more types of industrial equipment, including textile, pulp mill and miscellaneous, most of which is unrated.



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Steel Plates . . .

Plate Prices, Page 193

Plate demand continues relatively light, though requirements for freight car construction partially offset the drop in shipbuilding. Deliveries can be promised for September, with unrated orders accepted for that month. Ship repair is taking a large portion of present production in some areas.

Philadelphia — Despite several large plate awards and inquiries, demand is light, with deliveries promised for September. Unrated orders are accepted for that month. Awards of large orders for railroad cars, including hoppers, for construction during fourth and first quarters indicate substantial improvement in buying, partially offsetting decline in shipyard needs, including Navy work. Navy yards are drawing on inventories. Newport News, Va., yard has been awarded a contract for three refrigerator ships for United Fruit Co., requiring about 12,000 tons of hull steel, which will be distributed soon, deliveries to start in fourth quarter.

New York — Plate deliveries generally fall in September and unrated orders for sheared are being taken for that month. Despite heavy decline in shipbuilding requirements, miscellaneous buying is substantial and greater than a month ago, although the aggregate volume is far below peak. For car building a substantial spurt in buying is developing for fourth quarter. Floor plates can be scheduled for late August with demand improving slightly, although trailing first half in the last two years. Jobbers' inventories have been brought close to normal in most instances. Demand for pontoons in the East has dropped, but a leading fabricator in the East has work scheduled through the balance of the year at reduced pace.

St. Louis — Plate demand in this area remains easy, with production from 12 to 15 per cent of total flat-rolled shipments. All is earmarked for ship repair since completion of the Maritime Commission's construction program.

Chicago — Plate load continues to decline moderately for producers not carrying heavy commitments on bomb steel. Requirements for shipbuilding use taper off. Evidence of this is the fact that the Maritime Commission is understood to have completed its steel buying program and has closed its expediting offices. In the future, contractors given Maritime Commission work will arrange for their own steel purchases. Plate deliveries stand in late third quarter and early fourth.

Tubular Goods . . .

Tubular Goods Prices, Page 193

Philadelphia — Demand for merchant pipe reflects replacement buying by distributors. Butt-weld is booked for November, lap-weld 10-inch and over for October and smaller sizes for September. Some mills are slightly beyond this average. Utilities show more interest in postwar requirements, with considerable expansion of distribution systems on the boards.

Wire . . .

Wire Prices, Page 193

Pittsburgh — Mills are booked through the remainder of this year on most wire items. Demand for merchant products continues heavy; requirements for cement-coated nails are particularly acute. With production of fence freed from CMP directives a slight increase in output is indicated this quarter. Little change in barbed wire and mesh is expected, while bale ties are likely to remain on directive basis through August. Some open capacity may develop late this quarter on fine wire under 0.020 gage, resulting from over 50 per cent cutback in Signal Corps communication wire program. However, steel may be required for other wire drawing operations. Spring wire supply remains inadequate, with the bed spring industry one example of an industry unable to get scheduled deliveries on allocated basis. Pending export tonnage for rods includes 11,000 tons for France for third quarter, and there is little likelihood that delivery can be made unless a directive is issued.

New York — Common bright wire for third quarter delivery will be possible with some mills, result of easing in rated volume affecting drawing capacity and rods. Cutbacks in signal corps wire may also permit some shipments during the period in those size ranges. Brush wire inquiry, somewhat heavier, will also be filled in third quarter by some producers. While demand for spring wire in other directions has slackened, pressure for spring material by bedding and furniture manufacturers is strong. On the whole, however, aggregate overall wire

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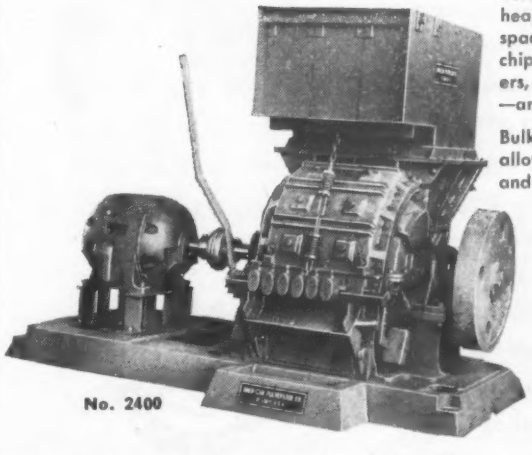

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tonnage available this quarter against unrated orders is not large. Openings in rod capacity are sought for 40,000 tons, French lend-lease. While some mills have bright drawn wire for late third quarter, other mills are in November.

Boston — Prospects for filling unrated orders for third quarter in any volume are not bright. While in spots some openings are possible, few definite promises are made. There is slight easing in rope wire, with moderate reductions in continuing directives. In the aggregate cancellations have not been centered in sufficient volume in any range of sizes or grades to affect substantal nearby tonnage. Also volume of rated orders holds about equal to shipments in most fine wire specialties. Galvanizing, patenting and heat-treating departments are still heavily crowded. Pressure holds for unrated automotive orders, including valve spring wire. Electrical wire and cable volume has slackened and there is some price shading on these. Hot metal departments are back to normal in one case where four open hearths were down for repairs earlier this month. Open hearth and finishing operations are both handicapped by labor shortages. Some readjustments in semifinished operations to meet most important finished tonnage orders are under way.

Rails, Cars . . .

Track Material Prices, Page 193

New York — Domestic freight car awards in June involved 670 cars, according to tentative estimates, bringing the total for the first six months up to 14,766, compared with 28,391 cars in the corresponding period in 1944. The principal award included 500 box cars for the Spokane, Portland & Seattle.

July has started well with 1400 units placed by the Erie. Pending are 1000 cars for the Baltimore & Ohio, 1000 for the Bessemer & Lake Erie, 1200 for the Chicago, Burlington & Quincy, 700 for Delaware, Lackawanna & Western, 2000 for the Louisville & Nashville, 1000 for the Southern railway and other smaller lots.

Structural Shapes . . .

Structural Shape Prices, Page 193

New York — Structural mills have moved into October on most sizes and November on some. Likelihood of filling unrated orders for third quarter delivery is small. Rolling schedules have been eased less than expected by shell steel cutbacks. Awards are light in this area, but tentative and forward inquiries are heavier. Bridge tonnage is led by 400 tons, replacement section, Brigantine channel, Absecon, N. J., bids in. Most fabricating shops are now seeking tonnage, including those tied up with special war equipment for a long period.

Boston — Preferential ratings granted for industrial reconversion in New England are thus far largely for equipment rather than construction. As of July 1 there were 15 applications in Massachusetts, valued at $750,000. Of this, domestic mechanical refrigerators totaled $143,000; stoves and ranges, $275,000, and commercial refrigeration equipment $154,000. In Connecticut there are 52 approved applications, $1,949,000, of which $400,000 are for textile mill products.

Philadelphia — Inquiry for structural steel is lower but awards are slightly heavier. The largest project requires 2300 tons for Navy storehouses at Mechanicsburg, Pa. Plain material deliveries are in October, with few exceptions. Shape mills are slow to reflect cutbacks

Chicago — Requirements for structural shapes are in heavy volume, both for building construction and machinery building. Government has approved a limited number of postwar plant and essential building projects and for these purposes early delivery can be assured only by directive. Within the past few days several construction jobs bid earlier have been awarded to fabricators. Late third quarter appears to be the first open dates for inserting new plain shape tonnage into mill schedules.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 193

New York — Although state highway bids have been resumed by New Jersey and Connecticut, initial inquiries are for small lots. Awards are few and most are under 100 tons. Several veteran hospital additions in the East are active, also 500 tons for a municipal hospital at Hartford, Conn. A factory building in Brooklyn takes 307 tons.

Pittsburgh — Little increase in reinforcing steel production is expected over the next few months despite the fact reinforcing bars have been taken out from under CMP directive control. Since

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merchant bar production is still governed by directives and carbon bar delivery schedules are well extended, there is little likelihood any production of reinforcing bars for unrated orders will occur before the closing months this year. Sellers state backlogs of validated reinforcing bar orders represents 4½ months' output at the June production rate.

Reinforcing bar producers east of the Rocky Mountains booked 67,000 tons during June, a considerable portion of which is destined for shipment abroad under lend-lease. Latest available figures on a nation-wide basis show shipment of reinforcing bars for the first four months this year totaled 224,000 net tons, against 192,000 tons in like 1944 period. Sellers state that spread in shipments between the two years widened during May and June and there are indications of still further gain through the remainder of this year. About 11 per cent of the total shipments through April this year represented rerolled rails. Peak in reinforcing bar shipments in recent years occurred in 1941, when a total of 1,835,000 tons was reached.

Chicago — Activity in reinforcing steel has been light, awards in excess of 100 tons being almost negligible and inquiry scarce. In all probability considerable tonnage will be required in most of the large new industrial plants for which structural steel has recently been placed or is now pending.

Pig Iron . . .

Pig Iron Prices, Page 195

Entire production of pig iron is being absorbed by melters and shortages appear occasionally, although supply in general is sufficient. Foundries which shut down the first week in July did not suspend deliveries, using the iron to rebuild inventory closer to the allowable 30-day limit. Foundry backlogs are mainly for war purposes, with little likelihood of civilian castings being made to any extent.

Pittsburgh — Pig iron demand this month is expected to absorb all of current near capacity output, with the result that blast furnace interests and consumers will continue to operate on a restricted inventory basis. Iron production continues limited by manpower shortage and to a greater extent by low coking coal supply and strikes at by-product coke plants. Foundry operations here have been little affected by cutbacks in war contracts and most report heavy backlogs of rated orders and consequently there is little likelihood that much tonnage of castings for civilian goods will be shipped this quarter. Allocation of iron into the Chicago district, plus the fact that blast furnace interests here have had to turn down over 200,000 tons of iron for export, are indicative of the general tight supply situation in pig iron.

Buffalo — An increasing amount of peacetime-civilian work is seeping into foundry operations, but by far most business is still tied with the war effort in this area. Vacation periods in foundries have had little effect on shipments. Producers report moving what little iron was put on the ground during vacation week. Heavier tonnage is moving to railroad castings, which is rapidly becoming one of the chief consuming lines. Local sellers appear a bit confused over reports elsewhere that a sharp increase has been shown in movement of iron from here into the New England territory.

Cincinnati — Foundries have resumed pre-holiday levels, all working against substantial backlogs and aware that other potential business is available were melters able to handle it. Specifications for July pig iron were infrequently curtailed, despite the shutdown for one week, as most of the foundries sought to build inventories closer to the 30-day maximum. A survey of contracts for the entire quarter disclosed anticipated needs holding close to those of first or second quarter.

New York — Contributing to tightness in basic and bessemer grades are temporary shortages in continuous pouring districts from time to time which are filled from other areas. To meet sustained demand for foundry iron furnace schedules for basic are also under strain. Melt requirements are met from current production schedules and there are no furnace stocks. Primarily due to labor shortages, producers of civilian products taking castings on which restrictions are being lifted, seek additional subcontractors to expedite reconversion output. Delivery of iron via the barge canal is well below normal because of lack of boats and there is no iron at Beacon.

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outstanding barometer, pig iron requirements when reconversion to civilian products gets into stride, should be substantially heavier. To bring production up to demand, textile mill equipment must be doubled annually from $40 million to $80 million; backlogs for repair parts approximate five months production and ratings for most textile machinery are being upgraded to AA-1 from AA-3. Currently production by the industry is less than 50 per cent of 1941 level; by 1946 WPB hopes to have it at 100 per cent of 1941 with gray iron castings the bottleneck in this aim. Paper mill equipment and other heavier civilian needs, plus a continued strong war demand, indicate sustained pig iron melts with concern as to supply late this year and early next. Buffalo district is filling most requirements. Depleted inventory is gradually restricting ability of the Everett furnace to fill needs even within Boston trucking area. Resumption of blast by Mystic furnace is still uncertain. For the next few months prospects are supply will be ample on 30-day inventory basis, but a pinch next winter is a distinct possibility unless conditions change. Larger tonnage from integrated steel works before fall is foreseen by some, but one producer in Pittsburgh district has withdrawn from open market entirely. Furnace stocks are nonexistent and before steelworks iron can ease the supply situation, ingot production will have to fall substantially below current rates and steelmaking scrap become freer.

Philadelphia — Suppliers of basic pig iron are making progress in catching up on schedules and while current requirements are met there is no margin beyond demand. No increase in the small volume to the merchant trade available from steelworks furnaces is indicated in the near future, with idle units down for repairs or other reasons a factor in the narrow supply situation. Indications are that foundry melt will increase slightly later this quarter as labor supply improves, as numerous shops move toward heavier production of castings for civilian goods on which restrictons are being relaxed. Silvery grades are tightening with increased automotive demand ahead. Producers are unable to take on additional silvery tonnage in most cases, while demand for that grade to carry heavier scrap charges in some shops cuts into the malleable ratio. Gray iron foundries are taking in more iron, preparatory to increased operations. Sweden wants 60,000 tons of bessemer and that tonnage is not in sight.

Scrap . . .

Scrap Prices, Page 196

Scrap is becoming increasingly tight as material from industrial sources is reduced by military cutbacks while demand for steel continues strong. The pinch has become so tight that WPB has allowed some steelmakers to buy electric furnace grades for use in open hearths, thus reducing the supply of the higher grades to electric furnace operators. Borings and turnings continue to advance and are now close to ceilings in some areas. Practically all steelmakers are in the market for material.

Pittsburgh — Small allocations of scrap are coming into this district with most going to other mid-western steel centers, notably Chicago. With active demand and ceiling prices now generally prevailing in the East, the flow of scrap from that center into this area has declined considerably. Mills generally are actively in the market for all scrap grades, although in a few instances producers have refused all tonnage offered. Quality of heavy melting steel moving into this district has been satisfactory for some months, with only an occasional rejection reported. Despite active buying in recent weeks, inventories at steel plants and foundries remain relatively low. Indicative of the general strength in scrap market, prices on turnings are approaching ceiling, with some minor sales of short shoveling turnings reported at ceiling.

Cleveland — Great activity prevails in the steel and iron scrap market, regarded by some as the tightest situation of the war years. Production has been reduced by cutbacks in war materials but blast furnaces and open hearths continue to produce at a high rate, thus causing a pinch. Permission has been given by War Production Board for some open-hearth consumers to buy electric furnace grades for use in their melt, thus curtailing supply for electric furnaces. All consumers are in the market and are pressing for tonnage. General shortage exists in all good carbon steel grades. Borings and turnings range higher, though still below ceilings. Further advance in these grades is expected.

Buffalo — Prices on steelmaking scrap bounded back to ceiling levels, plus fees, on sales of approximately 18,000 tons. Activity was brisk as approximately 10,000 tons were sold earlier in the week at ceiling, less commission. This makes better than 50,000 tons sold by local dealers in about a month. Strong tendencies enveloped the entire market as turnings crept closer to ceiling with advances of 50 cents a ton on latest business. Dealers report recent sales made up mainly of No. 1 and No. 2 heavy melting and hydraulic bundles. Huge peacetime order backlogs are rumored as back of the considerably improved buying interest. Dealers also report a better movement of material into yards. Another barge shipment of approximately 1500 tons has arrived. An additional 3000 tons is reported en route. A 5000-ton boatload is expected from an upper lakes point.

St. Louis — Scrap shipments to St. Louis remain low, most supplies being allocated to Chicago. Most large melters are still out of the market. Labor supply is reported improving in rural areas. The Chicago demand, plus a decreasing supply here, due to plant cutbacks, has raised the price of machine turnings to $9.50 and shoveling to $11.

Boston — Demand for heavier grades of steelmaking scrap is active, notably from district and Eastern Pennsylvania mills, which offsets some slackening in Pittsburgh area volume. Machine shop and shoveling turnings are firmer, reflected in a bid of $7 per gross ton for accumulation of the former, Watertown arsenal, by J. Borowsky & Sons, Fitchburg, Mass. Steelworks are frequently high on attractive lots in open sales; Bethlehem Steel Co. bid $10.81 f.o.b. on 800 tons of unprepared gun tubes, Watertown. Highest dealer bid was $10.66. Low phos plate clippings to foundries bring full differentials, but for Pitts-

burgh the price is slightly below inland ceiling and $1.22 under port differential. Little is going at that price. Although some foundries are slowly improving stocks of cast, in general those grades are scarce. Chemical borings, at ceiling and port differentials, are also in good demand and output is readily absorbed.

Cincinnati — Activity in iron and steel scrap is restricted by lack of tonnage buying, as mills continue their conservative attitude, and by shortage of manpower at yards. Demand for rails and good cast persists and the market generally is strong at ceiling. Firming in prices on turnings and borings in nearby districts has been reflected in this district, from which some tonnage may be drained because of the wider price gap. Specialties are slow, some dealers and brokers refusing to pay more than heavy melting steel price in the lack of a ready market at the premiums.

Los Angeles — Dealers are turning more to salvaging reusable material in surplus material purchases, since the general market offers no inducement for large-scale scrap treatment. Mill buying is slow and WPB continues to allocate shipments to the East.

Philadelphia—Offerings of unprepared scrap are coming out in heavier volume at better prices, with steel mills high on bids in open sales, including 1500 tons at the Norfolk Navy Yard. Demand for heavy melting is strong at ceilings, with the exception of turnings. A firmer tone for the latter continues, approaching ceiling. Production of lighter grades of industrial steel scrap is slackening slightly. Cast scrap, notably No. 1, continues scarce. Yard preparation continues hampered by shortage of labor.

Chicago — Scrap continues active here with primary open-hearth grades moving promptly and at ceiling prices. Demand exceeds supply and allocations continue in considerable volume. Confusion still exists in turnings and borings, with broker-dealer trading to cover on old orders exerting substantial influence on prices. Machine shop turnings have moved up to a $13.25-$13.75 range, the latter being ceiling, but so far as known mills have not paid ceiling plus commission. New strength seems likely to develop in blast furnace grades because of the heavy demand for pig iron and a deteriorating blast furnace situation which reduces supply of hot metal.

New York — Heavy melting steel is at ceiling, with springboard prices paid by several districts, including Pittsburgh, the Valley and eastern Pennsylvania and barge scrap north of Albany. Demand is active with supply of strictly No. 1 limited. Demand from eastern Pennsylvania limits shipments on longer freight travel. Machine shop and mixed borings and turnings have advanced further to $8.50 to $9, dealer buying price, with demand improved. Cast and foundry grades remain at ceiling with supply tight.

Warehouse . . .

Warehouse Prices, Page 194

New York — Warehouses generally are accepting unrated orders for steel products on which they are reasonably sure replacements can be made on the same basis by mills. These include plates, hot-rolled alloy bars, in scattered instances, some sizes of hot and cold-finished carbon bars, tool steel and miscellaneous products on which deliveries are less extended under warehouse load schedules. This policy eliminates any substantial flat-rolled tonnage, notably sheets, except in heavier gages. Demand for steel from warehouse continues brisk, including some car-lot orders, reflecting tightness in mill schedules on some products. Canceled allotments with Z-1 and Z-2 symbols with jobbers involve limited tonnage, also ZW orders, now classified as unrated. A bright spot is improved freight deliveries from Pittsburgh and midwest points, reduced to around 10 days frequently. In Manhattan there is also a slight improvement in warehouse labor.

Pittsburgh — Despite a slight decline in shipments from warehouse stocks, receipts from mills have failed to match outgoing tonnage in recent weeks. One large distributor reports total inventory decline during June of nearly 1000 tons. Prospect of obtaining steel from warehouse on an unrated basis does not look too promising at the moment. This is due to the declining trend in inventories, plus inability of distributors to replace unrated orders on a rated basis after July 1, and the fact that WPB has already issued allotments for third quarter sufficient to absorb most of the steel produced. It appears likely that distributors will have to restrict their unrated deliveries on each product to an equivalent tonnage received from mills on an unrated basis. Warehouse stocks of hot-rolled sheets, galvanized sheets, carbon flats and rounds are in particularly short supply, in contrast to the substantially better inventory position in cold-finished items and alloy bars.

Considerable inquiry is reported from areas not normally served by local distributors, indicating much shopping around by contractors who have failed to obtain needed items from normal suppliers.

Cincinnati — Most local steel jobbers are not filling unrated orders, other demand showing no decrease. Replacement tonnage from mills is fairly heavy, but not in balance with demand. Jobbers are unable to meet calls for sheets and small rounds. Coal mining needs are slightly above normal, but there has been no considerable upturn in building operations for this district.

Cleveland — Warehouse trade shows little change, with steady demand, especially for flat-rolled material. Stocks are smaller than a month ago, with mill shipments showing little change, meeting schedules only fairly. Labor is a problem and deliveries are slowed by inefficient workers, especially for cutting and shearing.

Los Angeles — Warehouses report no lessening of demand, with inventories still low as mill shipments lag. While orders are being accepted for undated delivery of galvanized sheets, on which mill orders have been cut by WPB regulations, the situation does not warrant expansion of this practice. Demand is expected to continue high until the end of the Japanese war.

St. Louis — The warehouse situation shows no change over the past three months. Demand is good but inquiries are decreasing. Stocks are low and cannot be replenished beyond current needs. Demand covers all commodities,

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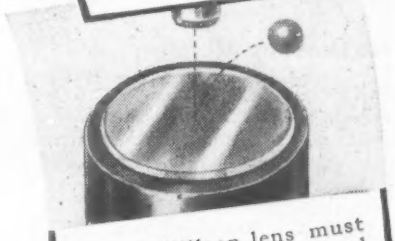

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notably in sheets and tubular goods. Sheets are not being promised before first or second quarter next year.

Philadelphia — Volume of buying has slackened slightly. Orders are about as numerous but tend to be smaller individually. Replacements show little improvement, notably in lighter flat-rolled products, and distributors are inclined to accept unrated orders only for products on which they are reasonably sure replacements can be made on an unrated basis. Plates and tool steel orders are in this category. As mill deliveries improve the ratio of unrated volume taken by warehouses will increase.

Chicago — Warehouses are faced with a difficult situation as customers press more heavily for unrated steel and any material sold on this basis cannot be replaced in view of the tight position of mills. Thus, distributors must exert care that validated steel only is sold, to insure that stock replacements can be made. Inventories are sagging and out of balance, and prospects are they will continue so. Demand for structurals is heavy, and that for sheets is tremendous. Mills are under constant pressure from warehouses for sheets of all types.

Nonferrous Metals . . .

Nonferrous Prices, Page 197

New York — Smallest since July, 1940, deliveries of refined copper to domestic consumers in June totaled 94,031 tons, compared with 139,203 tons in May. The decline was larger than had been estimated. Stocks starting this month were 70,738 tons, against 63,841 tons at the end of May.

Zinc shipments were also off last month to 54,478 tons from 66,972 tons in May. Peak for the war period in March, this year, was 94,494 tons. Consumers of zinc are reducing inventories in line with the changing supply and demand situation and not all the June decline is accounted for by cutbacks. Stocks are likely to increase over the next few weeks or until demand for civilian products improves materially.

Lead purchases for August delivery indicate consumption of primary metal during the next few months of about 60,000 tons per month. Stockpile is increasing as available supplies are sufficient to meet demand and will approach 85,000 tons by the end of July.

Tin heads the list as to shortage of materials in reconversion of the automobile industry. This shortage will become more pronounced as quotas are increased early next year and WPB is urging substitutes. Cadmium is second in the automotive short supply list and use of zinc is suggested, and also substitution of zinc plating for chromic acid. Antimony, substituted for tin in many applications, is third on the list, presenting many of the new engineering problems of the tin shortage.

Stainless Steel Easier

Supply of critical alloying materials has improved and military demand for stainless steel products has decreased, War Production Board officials have told the Stainless Steel Industry Advisory Committee. WPB reported that lessening of requirements of other countries for essential nickel needs has eased the situation here. Nickel accounts for approximately 8 per cent of materials entering into production of most types of stainless steel.

Canada . . .

Toronto, Ont. — Restrictions on purchase of steel by non-war consumers have been lifted in Canada, with the result that orders need not be approved by the steel controller before acceptance, it was announced from Ottawa this week. Representatives of Canadian steel companies can now deal directly with customers. On war orders, however, business continues to be placed by the steel controller and contracts of this nature must have his approval. While the rescinding of order SC 20B enables consumers to order direct, there is little unfilled capacity remaining this year and practically all new bookings are for delivery in early 1946. At present producers are endeavoring to reduce backlogs but at the same time their salesmen again are contacting customers with the object of renewing those contracts for future business but they are unable to make definite promises regarding shipments.

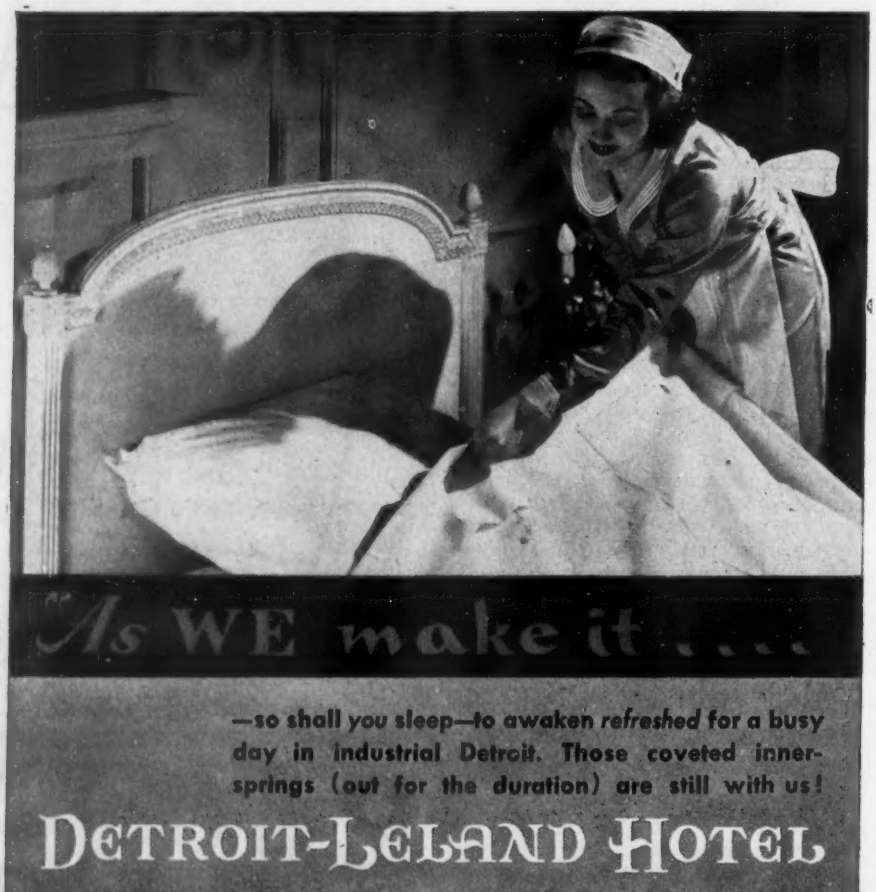
The Steel Company of Canada, Hamilton, Ont., is making progress with installation of its continuous strip and sheet mill, which will operate in conjunction with its plate mill. It is expected that a portion of this new unit will be in operation late this year and in full production in 1946 when the company will turn out a complete line of hot-rolled sheet products.

War contract cancellations for steel have had little effect on the supply situation and most materials are tight. However, orders continue to pour in despite the fact that most mills are solidly booked through this year on the more popular materials. Sheets are in heavy demand from civilian sources and inquiries continue to appear in large volume. New bookings also run to large tonnage, despite the fact that producers are not prepared to make promises regarding delivery and the majority have no additional capacity available this year. Many civilian concerns that have been expecting delivery to enable them to resume manufacture of consumer goods, have little prospect of obtaining any large tonnages this year, with the result that many peacetime programs may be delayed for months.

Bar backlogs extend to the end of the year and there has been no noticeable easing in supply through war order cancellations. On carbon bars mills are almost solidly booked, although some producers are said to have limited capacity available for additional business in alloy bars.

Plate demand, while steady, is not building up excessive backlogs and producers offer delivery in two to three months. Much of the new business is for non-war production activities and there has been steady falling off in war demand in recent weeks.

Little change was reported in the merchant pig iron market for the week and while demand is steady with sales running approximately 8000 tons, business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as a whole lacked special feature. Melters are taking lots of 100 to 200 tons and are not placing forward delivery contracts. Production schedules are unchanged, with 9 of the 14 furnaces in Canada blowing.

While there has been minor slowing in scrap receipts, the supply situation as a whole is somewhat in excess of consumer requirements. Dealers are making regular shipments to mills and the latter have been rebuilding depleted stock piles. Iron scrap supply also has shown improvement and while no large stocks have been accumulated dealers are said to be in a position to meet customer requirements.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

11,300 tons, assembly plant and press shop, Flint, Mich., for Chevrolet Motor Division, General Motors Corp., to American Bridge Co., Pittsburgh; bids June 21.

1600 tons, building addition North Carolina Pulp Co., Plymouth, N. C., to Bethlehem Steel Co., Bethlehem, Pa.

1150 tons, addition to naval ordnance plant of Amertorp Corp., Forest Park, Ill., for U. S. Navy, to Mississippi Valley Structural Steel Co., Decatur, Ill.; bids July 3.

650 tons, factory building, John Deere Tractor Works, Waterloo, Iowa, for Deere & Co., to Bethlehem Steel Co., Bethlehem, Pa.; bids June 20.

380 tons, terminal building, Chicago Municipal Airport, Chicago, for Department of Public Works, to Bethlehem Steel Co., Bethlehem, Pa.; bids June 29.

320 tons, factory building, Austin Western Co., Aurora, Ill., to American Bridge Co., Pittsburgh; Algot B. Larson, Chicago, contractor; bids June 20.

270 tons, three state bridges, Lancaster county, Pennsylvania, to Phoenix Bridge Co., Phoenixville, Pa.; Cayuga Construction Co., New York, general contractor.

223 tons, factory building, Prentiss-Wabers Products Co., Wisconsin Rapids, Wis., to Wisconsin Bridge & Iron Co., Milwaukee; Edward H. Meyers, Oshkosh, Wis., contractor; bids June 28.

200 tons, warehouse, George H. Pilling Co., Philadelphia, to Bethlehem Fabricators, Bethlehem, Pa., through J. R. Farrell, general contractor.

140 tons, addition for Electric Hose & Rubber Co., Wilmington, Del., to Bethlehem Steel Co., Bethlehem, Pa., through John E. Healey & Son, general contractors.

100 tons or more, for Bond Crown & Cork Co., Wilmington, Del., to Bethlehem Steel Co., through John E. Healey & Son, general contractors.

STRUCTURAL STEEL PENDING

402 tons, replacement section of Brigantine bridge, Absecon, N. J.; also 434 tons, steel piling and 1080 feet of wrought pipe; Charles Vachris Co., Brooklyn, low.

250 tons, factory building, Norge Division, Borg-Warner Corp., Herrin, Ill.

205 tons, 39 pile driver leads, various locations, for Bureau of Yards & Docks, U. S. Navy, Chicago; bids July 10.

200 tons, engineering building 132, Chrysler Corp., Highland Park, Mich.

100 tons or more, structural steel towers for transmission line, Longview, Wash., substation to near Kelso, Wash.; bids July 16, Bonneville Power Administration, Portland, Oreg.

Unstated, building for Harrison Radiator Division General Motors Corp., Lockport, N. Y.; John W. Cowper Co. Inc., Buffalo, general contractor.

REINFORCING BARS . . .

REINFORCING BARS PLACED

190 tons, expansion, E. J. Brach & Sons, Chicago, to Ceco Steel Products Corp., Chicago.

150 tons, Evangelical Church, Detroit, to Bethlehem Steel Co., Bethlehem, Pa.

130 tons, explosive laboratory, Naval Ordnance, White Oaks, Md., to Bethlehem Steel Co., Bethlehem, Pa., through Chas. H. Tompkins.

100 tons, bars and mats, state highway section, Hartford, Conn., to Truscon Steel Co., Youngstown, O.

REINFORCING BARS PENDING

307 tons, factory building, Fifteenth avenue, between 60-63rd streets, Brooklyn.

400 tons, foundation, Mississippi river bridge, Memphis, Tenn.; bids July 18.

400 tons, rubber research and development laboratory, B. F. Goodrich Co., Brecksville, O.

300 tons, factory, Joseph Smith Co., New York.

200 tons, engineering building 132, Chrysler Corp., Highland Park, Mich.

200 tons, Bureau of Reclamation, invitation K-23323, Boulder City, Nev.

175 tons, Pershing High School, Detroit.

105 tons, building, Loose-Wiles Biscuit Co., Long Island City, N. Y.

PLATES . . .

PLATES PLACED

2300 tons, gas holder for Delaware Power & Light Co., Wilmington, Del., to Cruse & Kemp; plates to Worth Steel Co., Claymont, Del.

2300 tons, including 800 tons of 48-inch and 1500 tons of 54 and 60-inch steel water pipe for Philadelphia; Leo Butler Co., Silver Spring, Md., and Kauffman Construction Co., Philadelphia, low on contracts.

PLATES PENDING

100 tons or more, two elevated steel tanks, Bureau of Yard and Docks, Navy Department, Navy Yard, Philadelphia; Chicago Bridge & Iron Co., Philadelphia, low, $152,850, spec. 16735; bids June 22.

PIPE . . .

CAST IRON PIPE PLACED

310 tons, 6, 8 and 12-inch, Three Rivers water district, Palmer, Mass., to Warren Pipe Co., Everett, Mass.

RAILS, CARS . . .

RAILROAD CARS PLACED

Central of Georgia Railway Co., 10 modern streamlined passenger to American Car & Foundry Co., New York.

Consolidated Railways of Cuba, 250 fifty-ton box, to Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill., division of H. K. Porter Co., Pittsburgh.

Erie, 600 gondolas, to Bethlehem Steel Co., Bethlehem, Pa., for Johnstown, Pa. shops; 100 covered hoppers to Greenville Steel Car Co., Greenville, Pa.

Illinois Central 500 fifty-ton box cars, 300 forty-ton automobile, 500 fifty-ton flats and 500 fifty-ton low-side gondolas to own shops.

Pennsylvania, 300 seventy-ton covered hoppers, to own shops, first quarter, 1946.

U. S. government, War Department, for China-Burma-India, 4000 thirty-ton, eight-wheel 42-inch gauge box; 190 thirty-ton eight-wheel 42-inch gauge tank, and 130 thirty-ton, eight-wheel 42-inch gauge refrigerator to American Car & Foundry Co., New York.

RAILROAD CARS PENDING

Baltimore & Ohio, 500 fifty-ton box and 500 seventy-ton hoppers.

Bessemer & Lake Erie, 1000 seventy-ton hoppers.

Canadian National (Grand Trunk Western) 300

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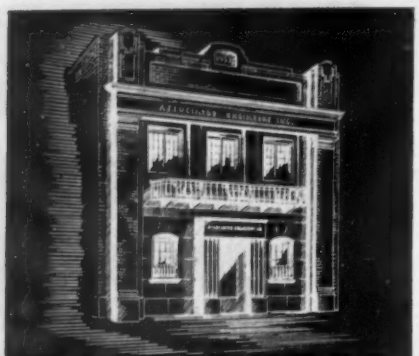

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forty-ton refrigerator and 2500 fifty-ton box.

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Chicago & Eastern Illinois, 200 fifty-ton box.

Chicago, Rock Island & Pacific, 250 auto box, 50½ feet, 50-ton capacity, and 750 auto box, 40½ feet, 50-ton capacity.

Delaware, Lackawanna & Western, 700 fifty-ton hoppers.

Denver & Rio Grande Western, 200 fifty-ton ballast and 25 seventy-ton covered hoppers.

Louisville & Nashville, 1000 fifty-ton box and 1000 seventy-ton hoppers.

Merchants Despatch, 500 forty-ton refrigerators.

New York Central, 750 seventy-ton covered hoppers.

Norfolk & Western, 500 fifty-ton box.

Reading Co., 500 fifty-ton box.

Southern, 1000 fifty-ton box.

St. Louis Western, 250 fifty-ton box and 50 fifty-ton flat-cars.

Western Maryland, 40 seventy-ton covered hopper cement.

LOCOMOTIVES PLACED

Western Pacific, five 1000-horsepower diesel-electric switchers to Baldwin Locomotive Works, Philadelphia.

Redeployment of Troops To Tax Transport Facilities

(*Concluded from Page* 85)

ham, labor vice chairmen in the War Production Board, have called upon industrial workers to help overcome the transportation problem by working overtime when necessary to unload and load freight cars promptly. They pointed out that demand for certain types of freight cars is even heavier this year than last, and more freight shipments must be hauled over longer distances. At the same time the number of freight cars is limited. WPB estimates that, as a freight car is ordinarily used once every 18 days, this use could be increased to once every 15 days if action were taken to expedite loading and unloading.

That the country's railroads are facing a critical assignment in handling both passenger and freight traffic during the next six to eight months appears to be well understood by the public and industry. This is seen in the acceptance given recent government orders affecting civilian pullman travel and the making of reservations.

The recent ODT order reducing from 30 days to 5 days the reserving of pullman space was issued without warning and thus gave no opportunity for discussion. However, the directive forbidding sleeper runs of less than 450 miles has caused relatively little criticism on the part of the traveling public.

Railroad officials hope the actions already taken will be sufficient to reduce civilian travel to a level that can be accommodated, but they are not sure this will be so. More drastic steps may have to be taken to restrict nonessential travel further.

Western railroads plan to maintain necessary civilian service although the burden of westward military traffic will increase 15 per cent by the end of the year.

As for freight traffic, adequate equipment to haul grain from western states has been the most troublesome spot recently. At the moment, this situation is getting some relief. It is stated there will be as many railroad cars to move Kansas grain as there were last summer, and possibly more. ODT says Kansas had 11,116 more cars on track June 1 than a year ago and the number increased toward end of the month. Railroads serving grain loading territories will have available more than 1000 hopper cars with temporary steel roofs for moving wheat.

So far, steelmakers have been hardest hit by insufficient box cars to ship tin plate. Some bad weeks have been experienced, but currently the situation is in hand. Shortage may recur before summer passes, however. To meet the tight box car situation ODT has called upon shippers and rail carriers to increase use of refrigerator cars for nonperishable freight shipments to certain western states. Such use has been permitted by Interstate Commerce Commission Service Order No. 104 since January, 1943, but now becomes more necessary because of the acute boxcar shortage and the increasing volume of both military and domestic traffic on western railroads.

Col. J. Monroe Johnson, ODT director, states increased use of refrigerator cars will eliminate hauling of empty refrigerator cars to the West, and insure an ample supply of refrigerator cars in the California fruit area. The ODT director called attention to the large volume of perishable freight that must be moved out of the West Coast states to meet consumer demands in other parts of the country and the need of supplying refrigerator cars for this traffic.

Unless full use is made of ICC order No. 104 permitting use of up to three refrigerator cars in lieu of one boxcar for shipments to California, Arizona, Nevada, Utah and Idaho, said the ODT director, a definite waste of transportation facilities will result from the movement of large number of empty refrigerator cars westward and empty boxcars eastward.

CONSTRUCTION AND ENTERPRISE

OHIO

AKRON, O.—Johnson Steel & Wire Co., 560 Hogue avenue, has been granted building permit for a shop addition 41 x 51 feet.

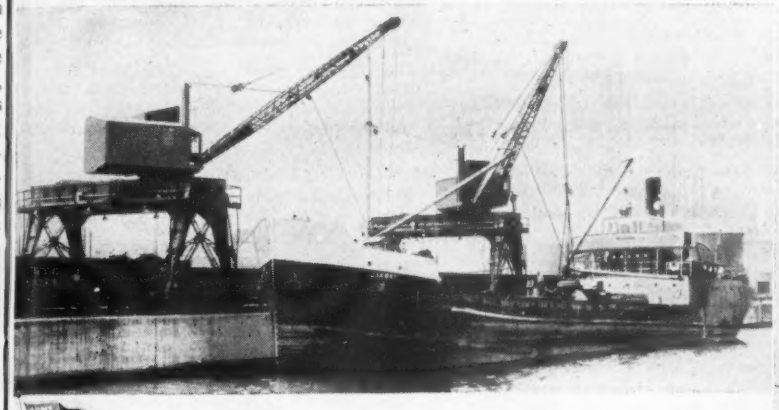
AKRON, O.—Ohio Mechanical Handling Co. has been organized by William F. Burse, 465 East Park street, and associates, with 250 shares of $100 par value to design and manufacture handling and moving equipment.

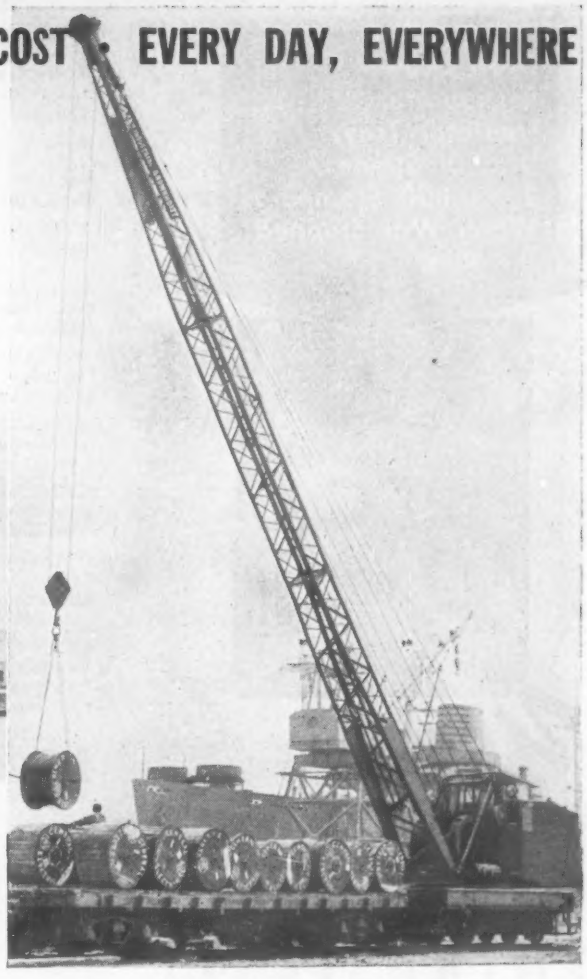
CANTON, O.—Hercules Motor Corp., 201 Eleventh street SE, has let contract to Melbourne Bros. Construction Co., Melett building, for a factory building 143 x 154 feet, to cost about $80,000.

CANTON, O.—Republic Steel Corp., Republic

I-B CRANES DO MORE WORK AT LESS COST • EVERY DAY, EVERYWHERE

No matter whether your material handling job calls for portal pier cranes, coal and ore bridges, car dumpers or Diesel Locomotive cranes, Industrial Brownhoist equipment is unsurpassed. Right: An I.B. Diesel Locomotive Crane with patented Monitor-type cab which allows operator 360° visibility—known the world over for dependable, low cost performance. Below: Two I.B. 4 Motor Electric Cranes, on traveling portal piers, have 10 ton capacity at 55 ft. radius, 26½ tons at 21 ft. radius.





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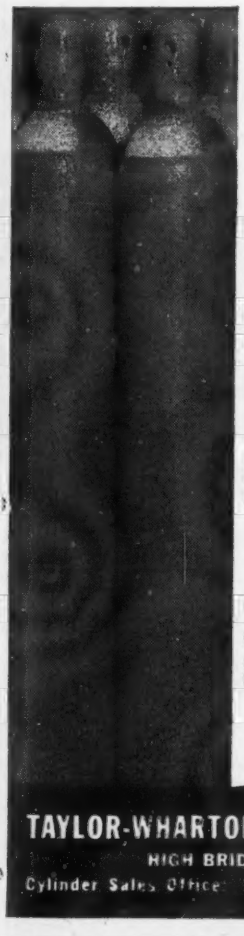

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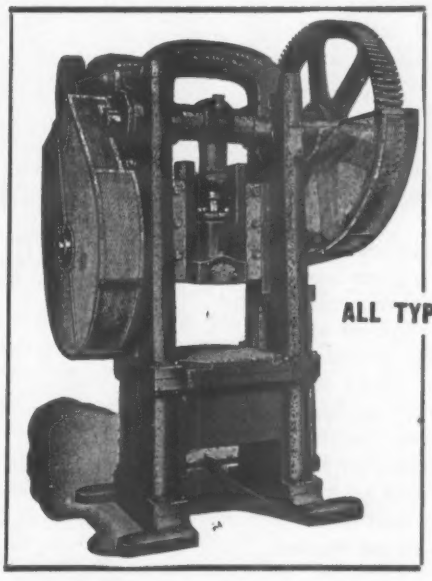

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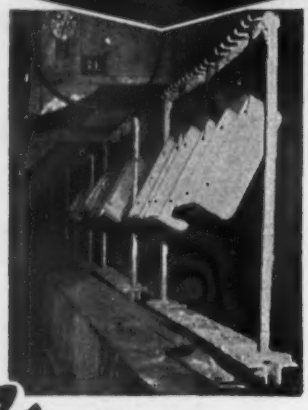

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If you could draw and form several times as many pieces as formerly, even on deep draws, between redressings, that also would help.

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Practically all manufacturers of automobiles, trucks, tractors, farm implements, refrigerators, stoves use Strenes metal dies—as do firms in many other fields. So can you—and to your advantage in cost and time.

Names of users on request.

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STRENES METAL
DRAWING AND FORMING DIE METAL

building, Cleveland, has been given WPB authorization for rehabilitation of three mill buildings and installation of spot welders, bonderizing and drying oven, graining machine, etc., to cost $640,000.

CLEVELAND—Cleveland Bronze Bearing Co., Caxton building, is making alterations in its foundry at 2152 Scranton avenue at cost of about $10,000.

CLEVELAND—Republic Steel Corp., Republic building, has been given WPB authorization for plant addition and installation of annealing furnaces, coils, condensing units, cooling fans, crane, etc., for annealing cold-rolled strip and sheets, to cost $1,090,000.

CLEVELAND—Cleveland Aircraft Tool & Die Co., Frank Zapco, 9016 Manor avenue, manager, will build a plant at Maple Heights, O.

CLEVELAND—Standard Alloy Co., 1679 Collamer avenue, is building a one-story machine shop 40 x 40 feet, to cost about $10,000.

COLUMBUS, O.—Lennox Furnace Co., 651 North Baxter street, plans a plant addition to cost about $50,000.

HAMILTON, O.—Fisher Body Division of General Motors Corp., Detroit, has WPB authorization for several buildings and installation of crane, boilers, substation, etc., to cost $2,016,000.

MANSFIELD, O.—Mansfield Tire & Rubber Co., plans plant expansion to increase tire production, at cost of $100,000 or more.

MIDDLETOWN, O.—Sorg Paper Co., 901 Manchester avenue, will take bids soon for a power plant addition, including new boiler and water treatment plant, to cost about $475,000. J. E. Sirene & Co., Greenville, S. C., are engineers.

MIDDLETOWN, O.—American Rolling Mill Co., has been granted WPB authorization for addition to existing building and installation of pinch rolls, shear equipment, furnace, conveyors, scale, motors, pumps, etc., to cost $618,842.

SANDUSKY, O.—Lake Erie Canning Co., care O. L. Teagarden, Port Clinton, O., has received WPB approval for rebuilding burned plant, including boiler house with equipment and canning machinery, to cost about $110,000.

STEUBENVILLE, O.—Chicago Wall Paper Mfg. Co. has WPB authorization for a one-story building approximately 30 x 50 x 27 feet and installation of boiler and coal stoker, to cost $40,000.

TOLEDO, O.—Doehler-Jarvis Co., 2100 Smead avenue, has plans by Gillette & Richards, 518 Jefferson avenue, for a three-story addition to cost about $60,000.

YOUNGSTOWN, O.—William M. Quinn Co. has been incorporated with 1000 shares no par value to deal in machinery, by G. F. Hammond, Mahoning Bank building, and associates.

CONNECTICUT

BRIDGEPORT, CONN.—Bridgeport Brass Co., 30 Grant street, will let contract soon for a three-story plant addition to building 40, East Main and Walter streets, to cost over $40,000. Fletcher-Thompson Inc., 211 State street, are engineers.

MANCHESTER, CONN.—Cheney Bros., Hartford road, have plans completed for a one-story 182 x 308-foot plant on Pine street, to cost $450,000. H. K. Ferguson, Hanna building, Cleveland, is engineer.

PENNSYLVANIA

ERIE, PA.—Hammermill Paper Co. has WPB authorization for a plant addition and installation of boilers, turbine, generator, condenser, conveyor, etc., to cost $2,060,300.

LEBANON, PA.—Lebanon Steel Foundry Co., Lebanon, has let contract to Hughes-Foulkrod Co., 1505 Race street, Philadelphia, for an X-ray building to cost about $40,000. Wilbur Watson & Associates, 4614 Prospect avenue, Cleveland, are architects.

MILTON, PA.—Boro of Milton, 28 North Front street, plans a sewage treatment plant to cost approximately $50,000. Albright & Friel, 1520 Locust street, Philadelphia, and Christian Siebert, 222 Willow avenue, Camp Hill, Pa., are engineers.

MICHIGAN

DETROIT—Tube-Craft Co., 8825 Grinnell road, has been incorporated with 1000 shares no par value to manufacture rigid and flexible tubes, by Victor L. Graf, same address.

DETROIT—Webster Co., 3353 Penobscot building has been incorporated with $100,000 capital to manufacture mechanical devices and machinery, by A. E. Bergman, 1913 University avenue, St. Paul.

DETROIT—Bay Metal Co., 2910 West Boston street, has been incorporated with 1500 shares no par value to deal in ferrous and nonferrous metals, by Jay Shapiro, same address.

IRON MOUNTAIN, MICH.—Lake Shore Engineering Co. plans a one-story processing plant 75 x 120 feet on East A street.

MARQUETTE, MICH.—George Banzhaf & Co. plan construction of a sawmill and boiler house.

MANISTIQUE, MICH.—Manistique Tool & Die Co. has started construction of a one-story plant addition 30 x 60 feet.

ROYAL OAK, MICH.—Bagprint Machinery Corp., 4363 Woodward avenue, has been incorporated with $2500 capital to manufacture bag-making machinery and aniline presses, by Walter S. Ryan, same address.

ILLINOIS

BELVIDERE, ILL.—National Sewing Machine Co. has let contract to Sjostrom & Sons Inc., Rockford, Ill., for a third and fourth-story addition, 80 x 81 feet.

CHICAGO—Metrex Valve Co., 5912 Division street, has sketches completed by S. Klefstad, 3600 West Fullerton avenue, for a one-story 125 x 125-foot plant.

GENEVA, ILL.—Modern Steel Equipment Co. and the Howell Co., manufacturers of metal furniture and kitchen cabinets, plan a one-story plant addition, 24 x 176 feet.

KEWANEE, ILL.—Kewanee Mfg. Co., steel truck bodies, hoists, etc., has let contract to T. S. Willis, Janesville, Wis., for a new plant to cost about $100,000.

ROCKFORD, ILL.—George D. Roper Corp., manufacturer of rotary gear pumps, stoves, ranges, etc., plans a one-story plant addition.

ROCKFORD, ILL.—Century Tool Co. has let contract to E. W. Ericson for a one-story machine shop 60 x 80 feet.

WOODSTOCK, ILL.—Electric Auto-Lite Co. has let contract to Oscar Strom, Crystal Lake, Ill., for a factory building to cost about $100,000.

INDIANA

FORT WAYNE, IND.—White Machine Works, 516 High street, has let contract to William P. Schenkel & Son, 1212 Putnam street, for a one and two-story 80 x 150-foot machine works, to cost about $50,000.

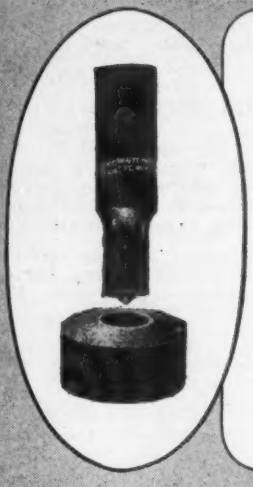
DELAWARE

WILMINGTON, DEL.—General Motors Corp., 132 General Motors building, Detroit, will let contract soon for a power plant, assembly plant and service building, to cost about $300,000. Albert Kahn Associated Architects & Engineers Inc., 354 New Center building, Detroit, is engineer.

MARYLAND

SPARROWS POINT, MD.—Bethlehem Steel Co., East Third street, Bethlehem, Pa., will

PUNCHES and DIES



for Power Presses, Hand and Foot Presses of all makes.

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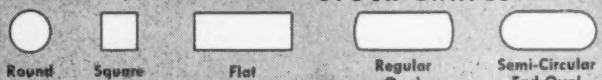

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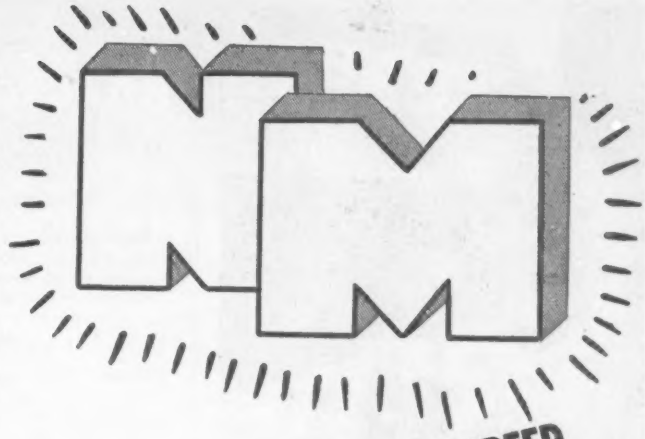

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let contract soon for a one-story locomotive repair shop costing about $130,000.

GEORGIA

ATLANTA, GA.—T. E. & Schneider, Huff road NW., plans a soap manufacturing plant to cost over $40,000, on site recently purchased.

LOUISIANA

SHREVEPORT, LA.—Southwestern Gas & Electric Co., 428 Travis street, is having plans made for an electric power generating station, to cost about $3 million.

FLORIDA

MIAMI, FLA.—Theobald Industries, Kearny, N. J., B. J. McWatters, representative, will build $250,000 plant for processing animal fats and tallows. Steward & Skinner are architects.

OCALA, FLA.—Ace Co., Don Campbell, manager, will establish a plant to manufacture blowers and commercial vacuum cleaners.

TAMPA, FLA.—Continental Can Co., 39th street and Sixth avenue, has priorities for construction of $745.000 addition, including one-story plant addition 130 x 220 feet, one-story warehouse 130 x 340 feet and installation of new equipment.

WEST VIRGINIA

WEIRTON, W. VA.—National Steel Corp. has received WPB authorization for additional facilities, including tin and zinc coating, to cost $384,800.

MISSOURI

KANSAS CITY, MO.—Metal Goods Corp., 1701 Baltimore avenue, will build an office building and warehouse covering 40 000 square feet in North Kansas City. It will be 160 x 250 feet. Contract has been let to Hiram Elliott, on plans by Neville & Sharp. architects.

ST. LOUIS—Steel Products Mfg. Co., 1418 Pendleton street, manufacturer of dies and stampings, has bought site at Chippewa and Hope streets for a one-story plant, 170 x 280 feet, to cost about $115,000.

ARKANSAS

JONESBORO, ARK.—Jonesboro Charcoal & Chemical Co. plans a plant six miles south of Jonesboro.

SUBLETT, KANS.—Northern Natural Gas Co., Aquila court, Omaha, plans natural gasoline and liquid hydrocarbon recovery plant and natural gas dehydration plant, to cost over $1 million.

WISCONSIN

KIEL, WIS.—H. G. Weber Co., manufacturer of paper bag machinery, plans a one-story plant addition 35 x 60 feet.

MADISON, WIS.—Oscar Mayer & Co, meat packers, plan addition to canning building. Henschien, Everds & Crombie, 59 East Van Buren street, Chicago, are engineers.

MILWAUKEE—W. C. Hibbard Machine Co., 1947 South 54th street, has let contract to Peters Construction Co. for a one-story plant addition.

MILWAUKEE—Consolidated Tool & Machine Co. has been incorporated to manufacture machinery and tools, by Deane DeMoulin, 1641 North 121st street, and David Wood.

NEKOOSA, WIS.—Nekoosa-Edwards Paper Co. has let contract to Frank J. Henry, Wisconsin Rapids, Wis., for a four-story bleach plant 68 x 72 feet, and a one-story filter plant 52 x 75 feet.

RACINE, WIS.—Racine Boiler & Tank Co is building a one story boiler shop addition.

SHEBOYGAN, WIS.—Maysteel Products Inc. plans erection of a plant to cost from $60,000 to $75,000.

WALWORTH, WIS.—Precision Products Co. has been incorporated to engage in manufacturing, by Peter Morrison, Robert E. Brandt and L. M. Strong.

WATERTOWN, WIS.—Manufacturers' Research Corp., subsidiary of Syncromatic Corp., Milwaukee, plans one-story factory 100 x 250 feet.

MINNESOTA

MINNEAPOLIS—Minneapolis & St. Louis railroad has let contract to James Leck Co. for a one-story addition to its locomotive shop 90 x 176 feet at Cedar Lake shops on Kenwood parkway, to cost about $160,000.

MINNEAPOLIS—Armco Drainage & Metal Products Inc., Edward Roberts, manager, plans new factory at Lyndale avenue North and 44th street.

MINNEAPOLIS—Delmar S. Rogers plans construction of one-story foundry 35 x 70 feet on Georgia avenue, St. Louis Park.

ST. PAUL—Minnesota Mining & Mfg. Co., manufacturer of abrasives, has let contract to George F. Cook Construction Co., Minneapolis, for a two-story plant addition 112 x 160 feet, to cost about $100,000.

IOWA

CEDAR RAPIDS, IOWA—Century Engineering Corp., manufacturer of oil burners, air washers, filter units, etc., has let contract to Frank Jirouch for a one-story plant building 60 x 140 feet.

CHEROKEE, IOWA—F. D. Booth plans construction of a one-story machine shop.

DES MOINES, IOWA—Western Tool & Stamping Co. will let contracts soon for a two-story addition 100 x 150 feet. Kraetsch & Kraetsch, Davidson building, are architects.

CALIFORNIA

HOLLYWOOD, CALIF.—Automatronic Laboratory has been established by Donnie D. Muir and Delbert J. Ward to do electro-mechanical experimental work and manufacture electro-mechanical devices, at 8472 Melrose place.

LOS ANGELES—N. J. Carnes & Co. has been formed by Nelson J. Karnes and Augusta M. Karnes and has established a machine shop and welding business at 6136 Ferguson drive.

LOS ANGELES—Aero-Tronic Mfg. Co. has been formed by E. W. Smith and Michael Pollock and has been established at 1745½ Pontius avenue, West Los Angeles, for manufacture of aircraft, radio and instrument parts.

LOS ANGELES—Delta Electrical Instrument Co. has been formed by W. S. Richards and J. Lloyd Sleeper and has been established at 1911 West Pico boulevard.

LOS ANGELES—Du. Lite Chemical Products has been formed by A. J. Ahlschlager and Matt E. Lee to process metals, at 1146 South Olive street.

LOS ANGELES—Zenith Aircraft Co. has been incorporated with $250,000 capital by Claude B. Andrews and associates, 704 South Spring street.

LYNWOOD, CALIF.—Micro Mfg. Co. has been organized by Ellis M. Wampler and Maxine Z. Wampler to manufacture precision drafting instruments, at 12135 Cornish street, Lynwood.

SANTA MONICA, CALIF.—Berkeley Machine & Mfg. Co. has been organized by Harry Niethus and has established its plant at 1744½ Berkeley street.

VERNON, CALIF.—Modern Metal Fabricators has building permit for a plant building at 4623 Hampton street, to cost about $25,000.

OREGON

SALEM, OREG.—National Battery Co., St. Paul, will build its twelfth plant, at Salem, to cost about $175,000, with capacity for 1200 storage batteries per day.

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Coiling heavy material up to 9/16" diameter calls for craftsmanship and machines with muscle. It also calls for experienced "beforehand" knowledge, the special talent of Raymond engineers. From the finest gauge material to the heaviest, Raymond craftsmen build your springs to the degree of accuracy required — in small lots or mass production. Let Raymond recommend the type of spring you need — for long life and dependable action.

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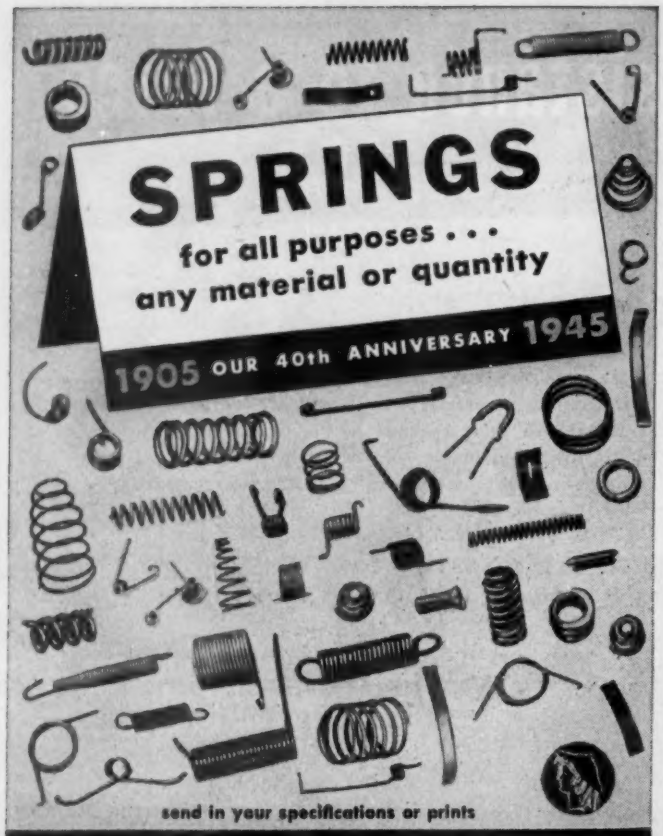

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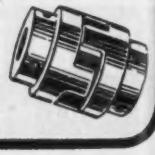

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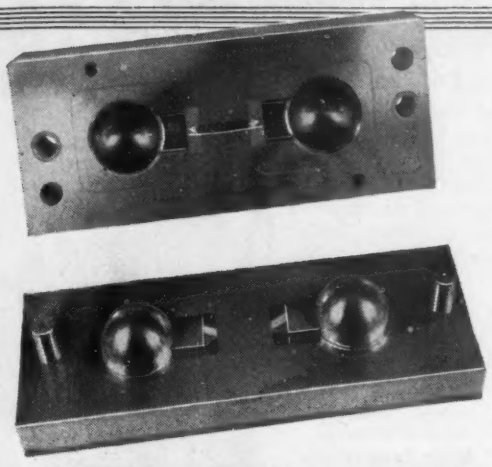

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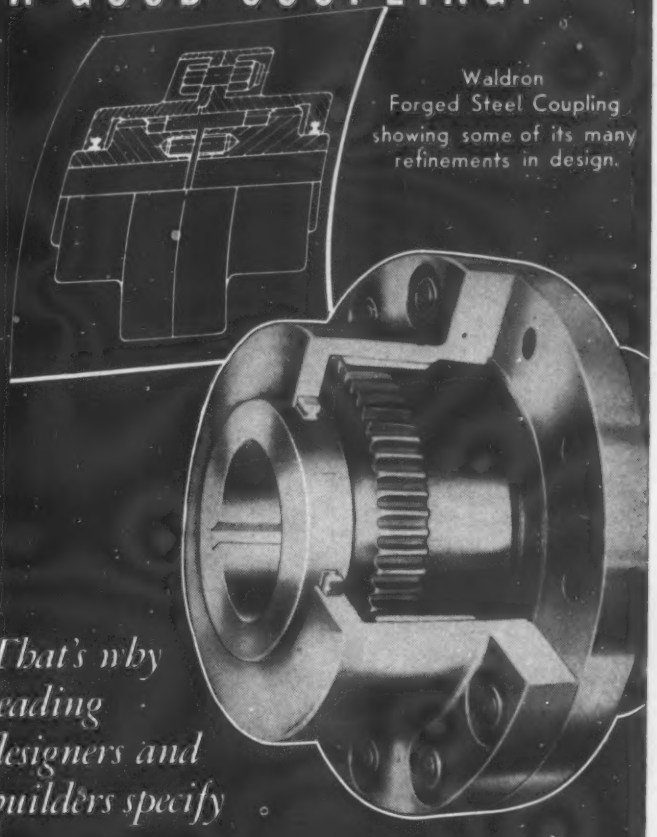

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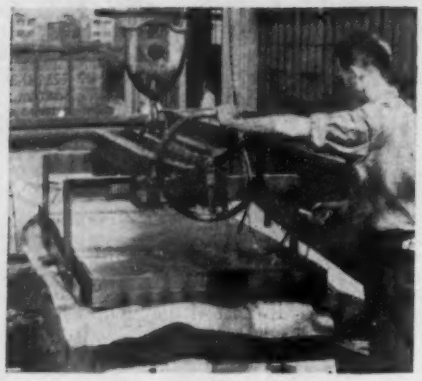

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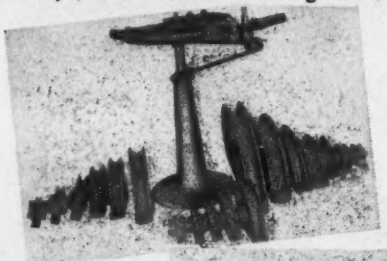

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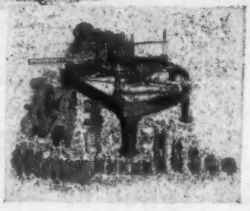

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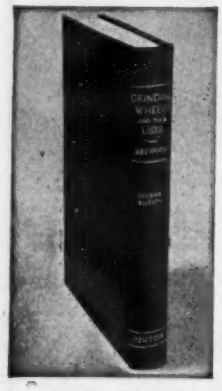

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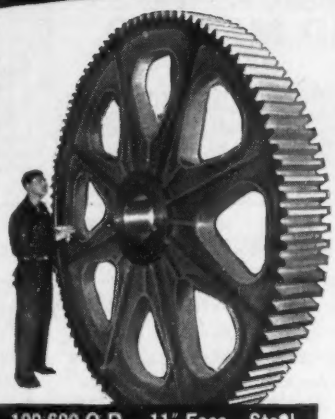

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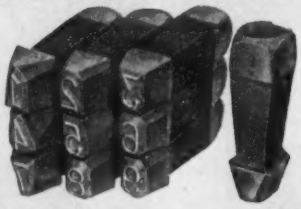

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ESTABLISHED REPRESENTATIVE IN DETROIT Area having good contact in Automotive and Tractor field. Also various other industries, desires to add drop forging and upset account on a commission basis. Address Box 977, STEEL, Penton Bldg., Cleveland 13, O.

Help Wanted

FURNACE ENGINEER WANTED

Old established Western Pennsylvania organization has permanent position for experienced man on steel mill furnace designing and estimating. Please describe education, experience, in detail, state residence telephone number and availability. Address replies to Box 986, STEEL, Penton Bldg., Cleveland 13, O.

WANTED
STRUCTURAL STEEL ESTIMATORS
By large structural steel fabricator. Previous experience desirable but not essential. Draftsman, structural detailers or those able to read blue prints urged to reply. Southern location. These are not temporary or duration openings. Address Box 993, STEEL, Penton Bldg., Cleveland 13, O.

WANTED—CARBIDE TECHNICIAN. WELL-known eastern company with established sales outlet has excellent opportunity for Chief Technician to develop carbide line, especially for wear resistant applications. Fundamental processing equipment installed. Company also interested in cast tool developments, precision and centrifugal castings, with particular reference to special heat resisting applications, such as gas turbines. State age, education, experience, salary desired and draft status. Address Box 903, STEEL, Penton Bldg., Cleveland 13, O.

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DRAFTSMEN WANTED—EXPERIENCE IN heavy machine tool work desirable, aircraft experience acceptable. Outstanding post-war picture for right men. Location, upstate New York. W.M.C. rules observed. Give full particulars in letter addressed to Box 923, STEEL, Penton Bldg., Cleveland 13, O.

WANTED: MAN WITH GENERAL OFFICE or field sales experience by large reputable manufacturer of seamless and electric welded tubing, alloy and carbon steels. Please apply giving full information, experience, etc., to Box 754, STEEL, Penton Bldg., Cleveland 13, O.

Help Wanted

WANTED
PRODUCTION MANAGER
Man experienced in planning, scheduling, machine loading and inventory control with experience in small lot production. Machine shop and sheet metal experience an asset. Excellent postwar prospects with an old organization in the Middle West.
Address Box 964
STEEL, Penton Bldg., Cleveland 13, O.

MANUFACTURING EXECUTIVE
A progressive Michigan manufacturer with excellent post-war prospects requires a man of high caliber for a responsible position in its factory organization. This man must have an educational background in mechanics, broad manufacturing experience and ability to handle personnel problems. Age not over 45. Give all details—age, education, experience, and salary expected—in first letter (if possible enclose a recent photograph). Excellent opportunity for the right man in a well established and successful business. Address Box 990, STEEL, Penton Bldg., Cleveland 13, O.

ELECTRICAL ENGINEER—A WESTERN New York manufacturer of heavy machine tools desires the services of an electrical engineer or experienced draftsman willing to break in on electrical designing. The work will consist of designing control panels, switchboards and electrical systems of large machine tools. This opening is permanent to the right man and offers excellent post-war prospects with well established, nationally recognized machine tool manufacturer. Apply by letter, stating age, experience, education and other pertinent data. W.M.C. rules apply. Address Box 922, STEEL, Penton Bldg., Cleveland 13, O.

DESIGN, DEVELOPMENT AND RESEARCH Engineers. Mechanical or electrical for work in one of the largest Resistance Welder Manufacturers. Salary open. Located, eastern Ohio. Our employes notified of this ad. Reply giving qualifications to Box 989, STEEL, Penton Bldg., Cleveland 13, O.

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at once

—and run monthly dividends into big totals

YOUR "dividend check" will depend on your machines, of course—but of this you can be sure: Farval Centralized Lubricating Systems will *begin* earning from the hour you install them; will *continue* earning as long as you operate.

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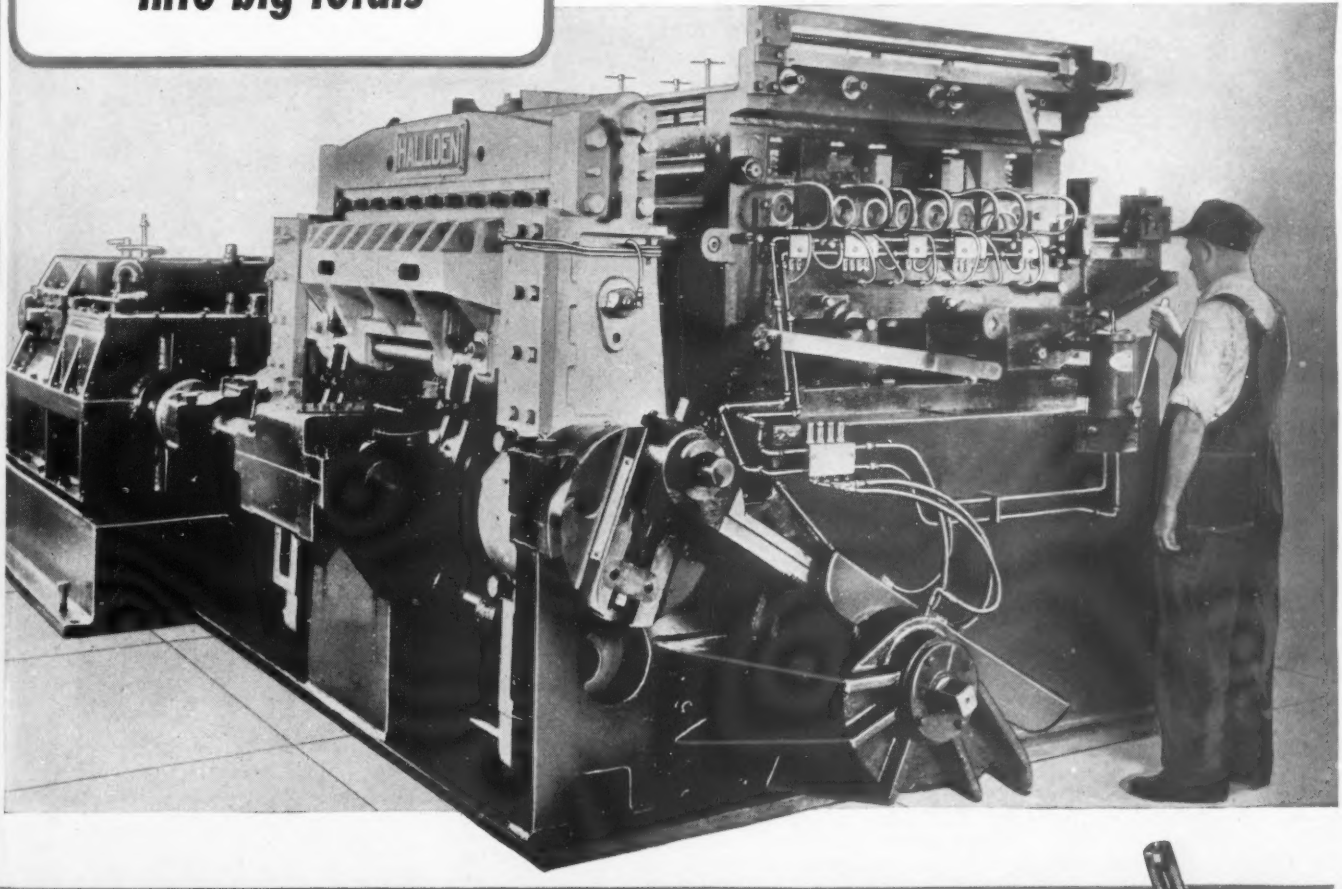

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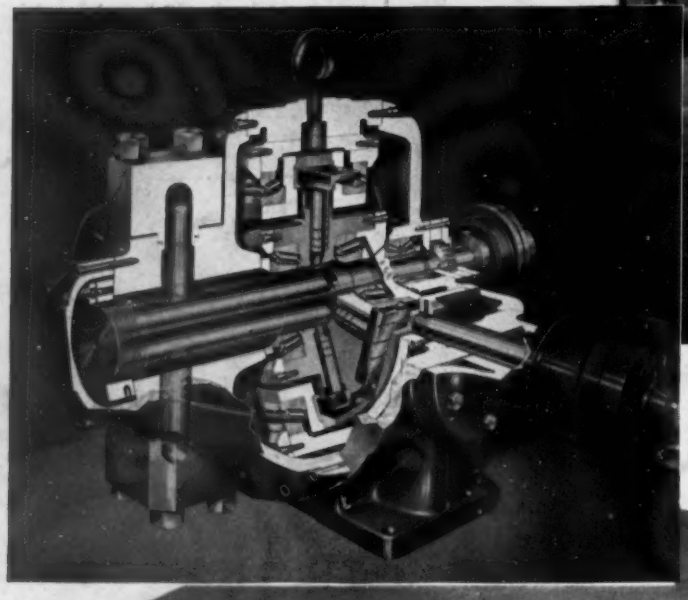

H-P-M Hydro-Power Radial Pump sectioned to show operating parts and locations of Timken Bearings.

The secret of the tremendous power and close controllability of H-P-M Presses is in the H-P-M Hydro-Power Radial Pump.

This pump combines high volumetric efficiency with dependable and consistently uniform performance, due to its design and fine precision construction.

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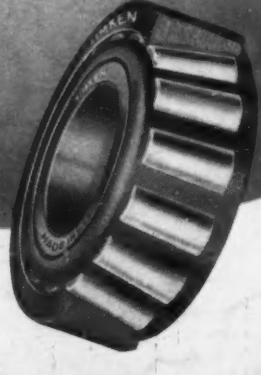
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